Simrad
CR40/42/50 MKII
DGPS ChartRadar

183.0600.202 English

01154.05

Note!
Insert or remove C-MAP cartridges ONLY through CHART menu or when unit is off.
All electronic navigation equipment is subject to external factors beyond the control of the manufacturer. Therefore such equipment must be regarded as an aid to navigation.
The prudent navigator will, for that reason, never rely on a single source for position fixing and navigation.

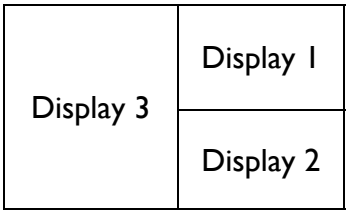
1830600202

MOB 'MAN OVERBOARD' function

MOB

In case someone falls overboard, press the [MOB] key and hold for two seconds (or activate an external MOB switch), and the system will provide all relevant data for an efficient rescue operation.

Press [CLR] to confirm and reset the alarm.



Screen layout default after activating MOB.

Display 1: The MOB display will provide the position where the man fell overboard, together with present course (C), bearing (B), and distance (DIST) to the MOB position.
Elapsed time - first in seconds and then in minutes. If "*" is shown instead of number of minutes, means that the elapsed time has exceeded 9999 minutes.

Display 2: The position display will provide present position, course, speed, and time.

Display 3: The CHART display will provide a graphical impression of the MOB position – a man waving his arms in relation to the ship.

MENU *Call up the menu bar, and…*

4,2 *Press* [4], *and* [2], *to turn the MOB function off*

MENU *Call up the menu bar, and…*

2,6 *Press* [2], *and* [6], *to re-call the last MOB position*

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1.1 Introduction and system familiarization

Congratulations on your purchase of **SIMRAD CR40/42/50 MKII DGPS ChartRadar** - a combination of the latest GPS receiver technology and built-in differential receiver for accurate positioning and prepared for SDGPS, plus: detailed cartography and high performance radar; all in a unique slim-line design with a 10" TFT (CR40), a 10" ATFT (CR42), or 14" TFT (CR50) large LCD display in color.

The CR40/42/50 MKII chart system includes a built-in world chart for rough planning and overview. The choice of chart system best suitable for the CR40/42/50 MKII was carefully singled out to be the **C-MAP NT mini cards.** The optional C-MAP charts are available world-wide at your local Simrad dealer.

The radar system with dual EBL and VRM markers, direct Quick-range keys, off-center mode, etc. together with Dual Radar feature … two radar displays in one screen, one for short range and one for long distance observations.

The Global Positioning System is at this time and age the most common system used for navigation and positioning all over the world. Not only for maritime use, but also for land-based applications and aviation. The satellite-based system has been developed and is operated by the US Department of Defense in order to provide an accurate and reliable service, which include a 24-hour global coverage.
The GPS system consists of approx. 24 satellites which orbit around the Earth at an altitude of approx. 20,200 km.
The satellites transmit perfectly synchronized data. However, depending on the position, the signals will reach the receiver at a slightly different time. By adding the measured time difference to the known position of the satellites it is possible to calculate the ship's position to within a few meters.

DS40/42/50 Dual Station - remote control unit for the CR40/42/50 is available in 10" black & white or TFT/ATFT color, or in 14" TFT color.

How to use this manual? The manual is written for the products:
CR40, CR42 and CR50, which all share the same type of software.
From hereon, these models are referred to as: **CRXX.**
It is a good idea if you make yourself familiar with the key functions, menu structure and rotation of pages (screens) described in chapter 2 before you start out, and then proceed with section 2.7 Initial start-up.

For quick location of a certain term, please check the ”Glossary of terms” and the ”Index” at the back of the manual.

How to interpret special marked key symbols, etc. in the manual:

+/- Either the + (plus) or – (minus) key may be applied.

0-9 Alpha-numeric keys for insertion of figures.

A-Z Alpha-numeric keys for insertion of letters.

☞ Emphasizes important points.

1,3 Indicates that you should press the keys **[1]** and **[3]** to obtain what is written in *italic* next to the keys.

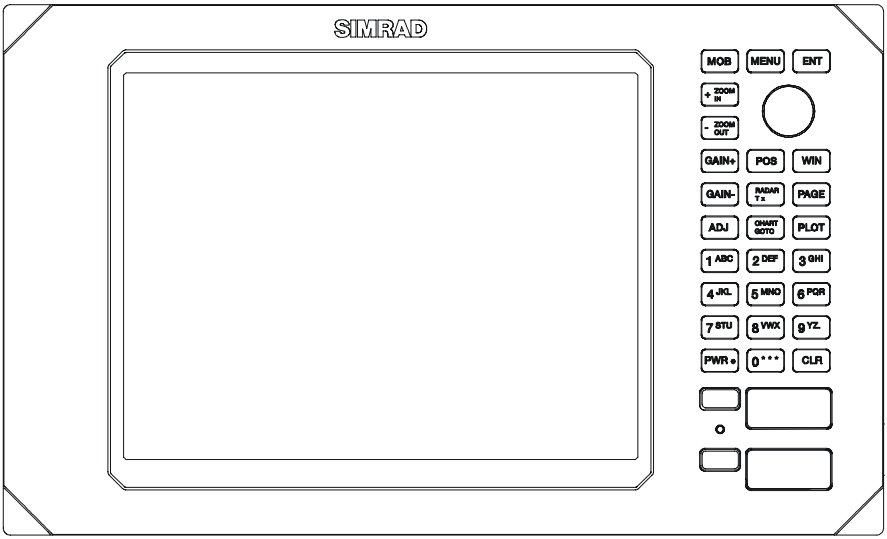
1.2 Safety summary

Precaution The operating unit should not be exposed to direct sunlight, as “boiling” the display may cause too high temperatures internally and subsequently damage parts of the unit beyond repair.

Quality service personnel The CRXX is sealed and does not contain any user serviceable parts. Opening of the unit will void its warranty. Touching electrical parts inside may cause bodily harm or death. If the unit is not working properly, please check section 9.12 Troubleshooting. If your CRXX requires servicing or repair, call your authorized SIMRAD dealer.

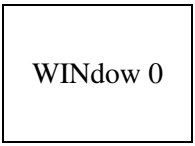
Power source, fuse and power cable Check that the DC power supplied to the unit is within the range of 10 to 32 volts. Note that the appropriate fuse must be employed (see the fuse rating in section 9.13 Specifications. Ensure that the power cord is firmly attached.

Grounding To reduce electrical interference and risk of electrical shock, properly ground the unit to the ship’s ground using the ground screw on the back of the unit. Good grounding should be exercised for connected equipment, refer to the installation & service section.

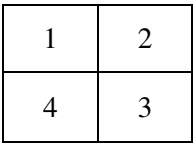


2.1 Fundamentals of the PAGE and WINdow system

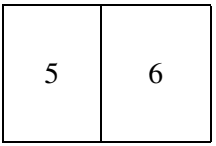
The CRXX DGPS ChartRadar has a multi-function screen data presentation system. You can choose to have a full screen, or a screen divided into e.g. a chart display and two data/chart displays, etc.
The display which is currently activated is indicated by a highlighted frame around the active window. There are five screen combinations to choose from:



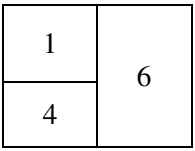
1. Full (1/1) screen.

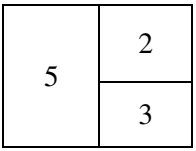


2. Four ¼ displays.



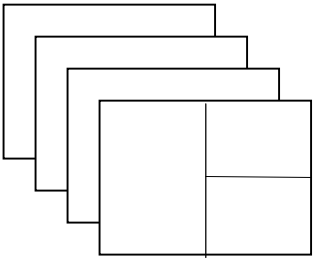
3. Two ½ displays.





4. & 5. Combination displays of one ½ and two ¼ displays shown together in the same screen.

☞ Not all displays are available in any size window.



As many as 4 screen combinations or full screens can be saved in 4 pages (layers).

Press the [PAGE] key to toggle between the 4 pages, or hold the [PAGE] key depressed for two seconds to start a rotation of the 4 pages. Press [PAGE] again to return to manual operation.

To mix and match the various chart and data displays you wish to have in the PAGE and WINdows presentation, you will first need to know what is pre-set from the factory:

PAGE *Scroll through the four pre-set pages* to see if you wish to exchange any of the displays with a different one.

Example of how to edit a pre-set page:

<table>
<tr><td rowspan="2">window 5</td><td>window 2</td></tr>
<tr><td>window 3</td></tr>
</table>

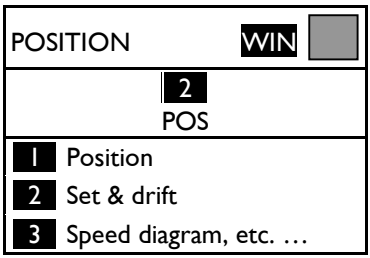
We pretend that in this page, window 2 contains the navigation display (highway), window 3 a chart display in a large scale for overview, and window 5 a chart display in a smaller scale to enlarge a certain area.
You now wish to insert the Position display in window 3 instead of the chart display. This is the procedure:

WIN *Press the* [WIN] *key until the frame around window 3 is highlighted*

MENU *Call up the menu bar, and…*
2,1 *then call up the POS menu and select "Position"*
- you will now have the Position display in window 3 instead of the chart display.

Example of how to edit a full screen to four ¼ displays:
We pretend that you are looking at a full screen which you wish to divide into four ¼ displays. This is the procedure:

MENU *First call up the menu bar, and…*
2 *then call up the POS menu* - see example next page.



What you do now will determine which WINdow the display you are about to select will appear in.

Press the [WIN] key repeatedly to scroll through the window system.

WIN *Press the* [WIN] *key once to select WINdow 1*
-which is the left top quarter of the screen.

1 *Select the Position display*
- you will now have the position display presented in window 1.
The rest of the windows in this page i.e. window 2, 3 and 4 will contain the displays which were pre-set from the factory. They can all be exchanged with new displays at your choice.

☞ However, the same display can not appear twice on the same page, so in case you are trying to select the same display in a second window, this is what will happen:

As per above example, you have selected the Position display in window 1, but it may just happen that the Position display was pre-set to window 2 – therefore window 2 will now show the legend: " Select display via MENU."

You may select the same display to appear on different pages, but not on the same page.

☞ An exception is the radar display, which only can appear in ½ window or full screen, and you can only have the radar display appear in one page at a time. You can not toggle from page to page and see different radar displays.

2.2 Key functions

A description of the key functions is available at the start-up display in the Quick guide. Some of the key functions are general and can be applied at any time, other key functions are related to a certain menu(s) and can only be applied when in the appropriate menu.

WIN Toggles between windows. The active window will have a highlighted frame. Only activated windows are operable.

PAGE Toggles between four pre-selected pages (screens). Hold two seconds for automatic rotation of pre-selected pages. A new, single press on [PAGE] will return to normal operation.

MENU Turns the menu bar on/off. Exits any data display without taking any action (except for radar control menu).

ENT Opens for/confirms insertion and editing of data (except for the radar function). Calls up information on marks, waypoints, etc. on chart together with several INFO windows from a chart display. Gives access to several setup displays. Exits radar control menu.

Moves cursor in data displays and charts + activates cursor on chart. Moves left and right in the menu bar.

MOB Hold two seconds to activate the MOB – "Man overboard" function, which starts a track and provides guidance back to the MOB position.

ZOOM + IN
ZOOM - OUT

Zooms in for greater chart details (smaller scale) / zooms out for better overview (larger scale). Increases/decreases range in radar function. + and – toggles between available values.

GAIN +
GAIN -

+/- adjusts radar gain. Optimum adjustment: Press [+] till noise appears, then press [-] till noise just disappears again.

ADJ Activates radar control menu + toggles between 1st and 2nd half of control menu in half screen displays.

POS Hotkey to Position display i.e. jumps to window on the screen with Position display; if none: inserts Position display in active window, except for Window 5 and 6, which are ½ screen sizes.

RADAR Tx Hotkey to Radar display. Hold two seconds to start transmission, go in Standby or Power off.

CHART GOTO Hotkey to Chart 1 i.e. jumps to window on the screen with Chart 1 display; if none: inserts Chart 1 in active window.
Activates INFO window with choice of navigation modes.

PLOT Plots down the actual ship/cursor position on chart. Activates INFO window with the possibility of plotting a waypoint, route, line, etc.

0-9 A-Z The alpha-numeric keys inserts and selects data in data displays.
Keys 1-9 are also Quick scales – selects fixed scales for charts or fixed ranges for radar. The 0 key will center the cursor/ship on the chart and activate/deactivate 'off-center to cursor' on the radar display.

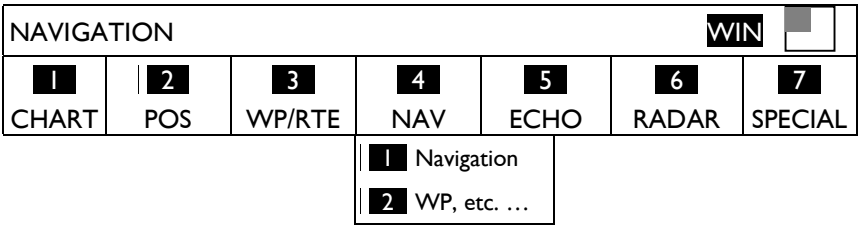
CLR Turns cursor off in chart display. Deletes data in enter or edit mode. From radar control menu: Returns Tune, Gain or Sea to AUTO-matic mode.

PWR ✸ Calls up a window where you can adjust the lighting in the screen, background light in keypad, and select Daylight display, Night display or custom made display. Hold two seconds to turn the power off.

2.3 Menu bar

MENU *Toggles the menu bar on/off*

To fit in the complete menu bar across the screen, some of the menus have been abbreviated. However, the last selected menu will be highlighted, and if it's an abbreviation of the menu, then the complete menu title is written above the menu bar e.g.:



Having selected e.g. 4:NAVIGATION from the menu bar, its associated menus will drop down. Key in the number next to the function you wish to call forward, or use the cursor key to highlight the function and press [ENT].

If you want to switch to a different menu, use the cursor key to move to the adjacent menu.

Most functions in the menus are general, and can be called forward at any time, but a few are related to a certain menu(s) and can only be called forward or activated in the appropriate menu. Inactive functions in the menu will have a different color from the rest of the functions. Which window is active (see top line of the menu to the right) can also have something to do with what functions are available. Use the [WIN] key to toggle between active windows and keep an eye on the functions in the menu to see how they may change color.

The menu bar will disappear from the screen at the selection of a function, or by pressing the [MENU] key. Besides, if not used, it automatically turns off after 30 seconds.

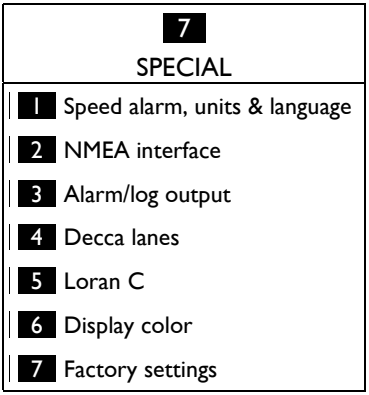
2.4 Menu layout

1 CHART	2 POS	3 WP/RTE
1 Chart 1 1:26400000	1 Position	1 WP list
2 Chart 2 1:6600000	2 Set & drift	2 Routes
3 C-MAP cartridges	3 Speed diagram	3 Route calculation
	4 Dual speed	4 Lines
	5 Wind	5 Start track
	6 MOB position	6 Stop track
	7 Satellites	7 Tracks
	8 DGPS	8 Targets
	9 DSC alarm	9 Data transfer

4 NAV*	5 ECHO	6 RADAR
1 Navigation	1 Depth & temperature diagram	1 Radar
2 Waypoint		2 Dual radar
3 Route		3 Radar setup
4 Track		
5 Anchor guard		

4 NAV**
1 Navigation
2 Turn NAV off
3 ETA & AVN
4 Set & drift trim
5 WP advance

The NAV menu is dynamic and will adapt to the function which is currently active.
* No Navigation mode is activated.
** One of the Navigation modes is activated.



When selecting a sub-menu in the SPECIAL menu, the display will always appear in a pop-up window. Which means that it will not take the place of another display, and it will not mess up the pre-set displays on the screen.
And once you have confirmed the changes, or just want to exit the display, the display will disappear from the screen, as you have no further use for it.

2.5 Choice of symbols

Waypoints and other points appearing on the screen can be marked by one of 18 symbols + 8 EVENT marks in small or large symbols:

Waypoint	Beacon	Marker	Starboard
Red buoy	Fish	North	Port
Green buoy	Platform	South	MOB
Wreck	Rock awash	East	EVENT 4 (1 of 8 types in diamond shape)
Danger	Harbour	West	

2.6 Naming of routes, points, etc.

First select the key with the desired letter, then you can either repeat the keystrokes, which will toggle between e.g. A,B,C,1, or once you have selected one letter you can go back and forth in the alphabet by means of the +/- keys. Use the cursor key to go to next space or to go back one space if you make a mistake.
Depending on the selected language the 0 (zero) key will hold special characters e.g. Æ Ø Å Ä Ö Ü Ñ, and the 9 (nine) key will hold: (empty space) . -
Press the [CLR] key to delete everything from cursor position and to the right of cursor on that row.

2.7 Initial start-up

PWR ✸ *To turn on the power, press and hold the* [PWR] *key till a picture appears on the screen*

PAGE *Press* [PAGE] *to scroll through a quick guide which informs of the use of the keys and where you can enter owner's setup*

ENT *Press* [ENT] *when ready to assume normal operation*

PWR ✸ *Press* [PWR] *again to adjust the lighting in the screen and select day or night display, etc., move around in display by means of the cursor key and change settings with +/- keys, and…*

ENT *Confirm with* [ENT]

The unit will now perform a fully automatic start-up and find the correct position without further data entries. The start-up phase is completed when a position appears in the position display – see section 4.1.

The radar function should not start transmission before the antenna is properly warmed up - refer to section 7.2.3 Start transmission.

Select display language:

MENU *Call up the menu bar, and…*

7,I *press* [7] *and* [I] *to call up the language display*

Go to the bottom line in the display

+/- *Select language*

ENT *Confirm entry*

2.8 Turn power off

PWR ✸ *Call up INFO window, and…*

PWR ✸ *Press and hold until screen turns black*

The CRXX is now turned off. All data and setups are saved and stored in the internal memory and, of course, will be available next time the unit is turned on.

3.1 Chart menu

1 CHART	
1 Chart 1 1:26400000	- see section 3.1.1.
2 Chart 2 1:6600000	- see section 3.1.1.
3 C-MAP cartridges	- see section 3.2.

☞ For safety reasons, navigation with electronic charts should always be combined with authorized paper charts.

3.1.1 Charts

It is possible to have two charts in different scales on the screen at the same time. Each chart can be operated individually, and each will have it's own cursor and individual chart setup.

MENU
WIN
1,1

Call up the menu bar, and…
select the WINdow in which the large-scale chart should appear, and…
press [1] *and* [1] *to call up Chart 1in scale 1:26400000*

MENU
WIN
1,2

Call up the menu bar, and…
select the WINdow in which the detailed chart should appear, and…
press [1] *and* [2] *to call up Chart 2 in scale 1:6600000*

The chart display opens for the built-in world chart, as well as the optional, detailed C-MAP electronic charts (C-MAP cart must be inserted in the drawers below the CRXX's keypad).

☞ Shortcut feature:

CHART
GOTO

Hotkey to Chart 1 i.e. jumps to window on the screen with Chart 1 display; if none: inserts Chart 1 in active window.

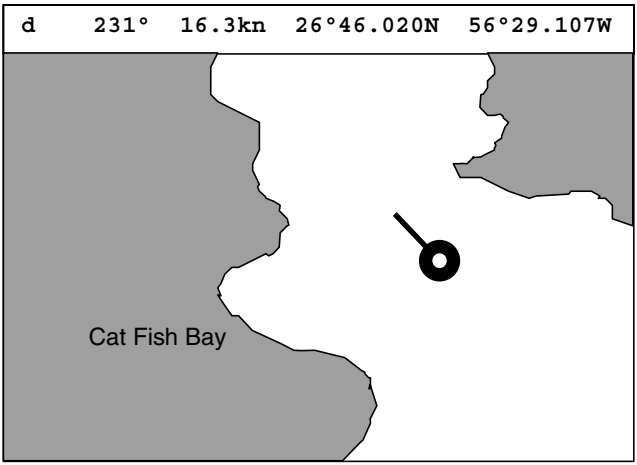


Chart scale indicator can be set ON/OFF in "Chart setup".

The top line of the chart display (with cursor off) will give you ship's position, speed, course and status of differential data – refer to section 4.1 Status indicator and accuracy.
With cursor on, the top line will show the cursor position in lat/long, bearing and distance from actual position to cursor position.

The ship symbol indicates the present position on the chart and the pointer informs of the actual true course (course over ground). There is a built-in autohome function which automatically moves the chart to maintain the ship symbol in the display (with cursor off).
☞ Press [ENT], [0] to center the ship on the chart.

Cursor function

With chart display active, press the cursor key to activate the cursor and…

CLR

Press [CLR] to turn the cursor off.

Use the cursor key to move cursor in any direction on the screen – the chart will automatically adjust when cursor reaches the edge of the screen.
☞ Press [0] to center the cursor on the chart.

In data displays the cursor will be shown in form of a ruling box around the active field.

Zoom function – with *cursor on*, the zoom function will zoom around the cursor. With *cursor off*, the zoom function will zoom around the ship´s position.

ZOOM + IN *Zoom in for details (smaller scale)*

ZOOM - OUT *Zoom out for overview (greater scale)*

1-9 ☞ Use one of the shortcut keys to quickly change the chart scale:

Press [1] = 1:6.600.000, [2] = 1:2.000.000, [3] = 1:600.000,
[4] = 1:200.000, [5] = 1:60.000, [6] = 1:20.000,
[7] = 1:6.000, [8] = 1:2.000, [9] = 1:600

Chart details may not be available in all scales in all areas. Non-covered areas will be marked as hatched or all blue with coordinate grid (with grid set to AUTO in chart setup), depending on the actual scale. See section 3.4 Chart setup for more details on what you might want to see in the chart and not see.

The **built-in world chart** can be zoomed up/down in six steps from a scale of approx. 1:33,000,000 to 1:2,000,000.

An **over-zoom function** enables you to zoom beyond the chart, which automatically is switched off and replaced by a lat/long coordinate grid. In this mode the scale can go down to 1:600.

3.2 C-MAP cartridges

On the front of the CRXX below the keypad are two small watertight drawers wherein you place the C-MAP cartridge(s) you wish to load.

☞ Do not attempt to insert or remove cartridges unless the CRXX is turned off, or chart reading is in stand-by:

MENU
1,3

Call up the menu bar, and…
load the pop-up window for C-MAP cartridge(s)

Example:

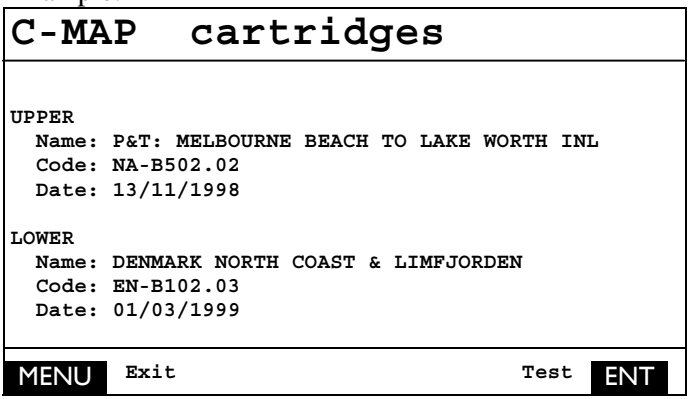


Chart reading is now in stand-by, and you may insert/ remove cartridges.

To open the drawer below the keypad, press the eject key next to the drawer. Place the cartridge in the tray with the terminals pointing towards the unit, and push the drawer back in place – it has to make a "click" sound to be closed tight and remain watertight.

ENT

Press [ENT] *to test the data on the C-MAP cartridge which you have just placed in one of the drawers*

The CRXX will now test the data on the cartridge(s) to see if its valid and free from faults.

☞ If a cartridge is defect, it must be removed before you can exit the display.

MENU *Return to chart display*

In addition to the larger boundaries of the world chart there will be separate boundary lines for the individual charts stored on the same cartridge. However, the boundary lines for the C-MAP chart areas can be turned off, so they will not be visible on the chart – refer to Chart setup.
Other chart areas can quickly be reached by means of the zoom keys:

ZOOM - OUT *Zoom out until desired area becomes visible*

Move cursor to approximate area, and…

ZOOM + IN *Zoom in*

The chart will automatically start to move when cursor reaches the edge of the screen. When cursor is switched off [CLR], the chart will return to ship's position.

☞ See also section 3.4 Chart setup.

3.3 INFO windows

A number of pop-up INFO windows are available mainly from active chart display. Only a few of the functions in the INFO windows can be accessed from data displays and other displays. Refer to sections 3.3.x.

3.3.1 Cursor inactive

ENT With chart in active window, and with cursor off, press [ENT] to *call up an info window* with the following to choose from:

Scale: 1:6600000		-Actual chart scale.
No user data at ship's position		
1	Edit user data	-Inactive function.
2	Chart info	-Refer to Appendix C.
3	Find nearest port services	-Refer to Appendix C.
4	Bearing & dist. from A to B	-Inactive function.
5	Lock cursors	-Inactive function.
9	Chart setup	-Refer to section 3.4.
0	Ship to center	
GOTO	Select NAV mode	
PLOT	Plot new data	
PAGE	More user data	
MENU	Exit	-Exit info window.

0 *Ship to center* will adjust the chart to place the ship's position in the center of the chart display.

GOTO *Select NAV mode* will activate Navigation mode.

PLOT *Plot new data* will give you the choice of entering the ship's position as eventmark, waypoint or target.

PAGE *More user data* will toggle between available data on the ship's position.

3.3.2 Cursor active but not placed on any object or data

ENT With chart in active window, and cursor not placed on any object or user data, press [ENT] to *call up an info window* with the following to choose from:

Scale: 1:6600000		-Actual chart scale.
No user data at cursor position		
1	Edit user data	-Inactive function.
2	Chart info	-Refer to Appendix C.
3	Find nearest port services	-Refer to Appendix C.
4	Bearing & dist. from A to B	
5	Lock cursors	
9	Chart setup	-Refer to section 3.4.
0	Cursor to center	
GOTO	Select NAV mode	-Refer to section 3.3.8.
PLOT	Plot new data	-Refer to section 3.3.9.
PAGE	More user data	-Inactive function.
MENU	Exit	-Exit info window.

4 *Bearing & dist. from A to B* will quickly provide the bearing and distance from your current cursor position (A) to an arbitrary point (B). Move cursor to point B and see the calculation in the small info window. Press [MENU] to exit the function.

5 *Lock cursors* will lock the cursors in two chart displays on the same screen and thus make the cursor movements synchronized. To return to individual cursor control in each chart display, press [ENT] and [5] to "Release cursors" again.
☞ See also "Lock cursors" in Appendix A.

0 *Cursor to center* will adjust the chart to place the cursor position in the center of the chart display.

3.3.3 Cursor placed on waypoint

ENT With chart in active window, and cursor placed on a waypoint, press [ENT] to *call up an info window* with the following to choose from:

WP found		
Name: WP 1 LAT 51°49.107N LON 5°16.007W		-Example.
1	Edit user data	
2	Chart info	-Refer to Appendix C.
3	Find nearest port services	-Refer to Appendix C.
4	Bearing & dist. from A to B	-Refer to section 3.3.2.
5	Lock cursors	-Refer to section 3.3.2.
9	Chart setup	-Refer to section 3.4.
0	Cursor to center	-Refer to section 3.3.2.
GOTO	Select NAV mode	-Refer to section 3.3.8.
PLOT	Plot new data	-Refer to section 3.3.9.
PAGE	More user data	
MENU	Exit	-Exit info window.

1 *Edit user data* opens for a new info window:

Waypoint		
1	Edit	Change the name, symbol, color, etc.
2	Move	Move waypoint with cursor, and press [ENT].
CLR	Delete	Delete waypoint ? “YES” / “NO”.
MENU	Exit	Exit info window.

PAGE *More user data* will be available if more than one point is plotted on the same position, where the [PAGE] key then will toggle between data for each point.

3.3.4 Cursor placed on route leg or line leg

ENT With chart in active display and cursor placed on a route leg or line leg, press [ENT] to *call up an info window* with the following to choose from:

Route leg found		
Name: RTE 1 Leg: B336° 77.16nm Total: 4 legs 215.6nm		-Example.
1	Edit user data	
2	Chart info	-Refer to Appendix C.
3	Find nearest port services	-Refer to Appendix C.
4	Bearing & dist. from A to B	-Refer to section 3.3.2.
5	Lock cursors	-Refer to section 3.3.2.
9	Chart setup	-Refer to section 3.4.
0	Cursor to center	-Refer to section 3.3.2.
GOTO	Select NAV mode	-Refer to section 3.3.8.
PLOT	Plot new data	-Refer to section 3.3.9.
PAGE	More user data	-Inactive function.
MENU	Exit	-Exit info window.

1 *Edit user data* opens for a new info window:

Route leg		
1	Edit leg	New info window to edit route leg.
2	Insert point	Move cursor and press [ENT] to insert point.
3	Edit	New info window to edit route.
CLR	Delete	Delete whole route ? “YES” / “NO”.
MENU	Exit	Exit info window.

3.3.5 Cursor placed on routepoint or linepoint

ENT With chart in active display and cursor placed on a routepoint or linepoint, press [ENT] to *call up an info window* with the following to choose from:

Routepoint found: 2		
Name: RTE 1 From start: To end:		-Example.
1	Edit user data	
2	Chart info	-Refer to Appendix C.
3	Find nearest port services	-Refer to Appendix C.
4	Bearing & dist. from A to B	-Refer to section 3.3.2.
5	Lock cursors	-Refer to section 3.3.2.
9	Chart setup	-Refer to section 3.4.
0	Cursor to center	-Refer to section 3.3.2.
GOTO	Select NAV mode	-Refer to section 3.3.8.
PLOT	Plot new data	-Refer to section 3.3.9.
PAGE	More user data	
MENU	Exit	-Exit info window.

1 *Edit user data* opens for a new info window:

Routepoint		
1	Edit point	New info window to edit routepoint's position.
2	Move point	Move cursor and press [ENT] to move point.
CLR	Delete point	Delete routepoint ? "YES" / "NO".
3	Add point	Only from first or last point in route.
4	Edit	New info window to edit route.
5	Delete	Delete whole route ? "YES" / "NO".
MENU	Exit	Exit info window.

PAGE *More user data* will toggle between data on routepoint and route leg.

3.3.6 Cursor placed on trackpoint

Trackpoints are not as easily recognized as Routepoints, you may have to move the cursor along on the track to locate a trackpoint.

ENT With chart in active display and cursor placed on a trackpoint, press [ENT] to *call up an info window* with the following to choose from:

Trackpoint found: 3		
Name: TRACK 1 Total: 836 points - 83.6nm		-Example.
1	Edit user data	
2	Chart info	-Refer to Appendix C.
3	Find nearest port services	-Refer to Appendix C.
4	Bearing & dist. from A to B	-Refer to section 3.3.2.
5	Lock cursors	-Refer to section 3.3.2.
9	Chart setup	-Refer to section 3.4.
0	Cursor to center	-Refer to section 3.3.2.
GOTO	Select NAV mode	-Refer to section 3.3.8.
PLOT	Plot new data	-Refer to section 3.3.9.
PAGE	More user data	
MENU	Exit	-Exit info window.

1 *Edit user data* opens for a new info window:

Trackpoint		
CLR	Delete point	Delete trackpoint ? “YES” / ”NO”
1	Delete points from A to B	*) see below.
2	Edit	New info window to edit track.
3	Delete	Delete whole track ? “YES”/”NO”
MENU	Exit	Exit info window.

*) Move cursor to point B and press [ENT] to delete all trackpoints between cursor position on chart and point B.

PAGE *More user data* if cursor is placed on a MOB track you can toggle between data on MOB symbol and data on MOB track.
☞ The symbol and track are edited separately.

3.3.7 Cursor placed on target

ENT With chart in active display and cursor placed on a marked target, press [ENT] to *call up an info window* with the following to choose from:

Target found		
Name: TARGET 1 LAT 57°40.636N LON 10°34.767W		-Example.
1	Edit user data	
2	Chart info	-Refer to Appendix C.
3	Find nearest port services	-Refer to Appendix C.
4	Bearing & dist. from A to B	-Refer to section 3.3.2.
5	Lock cursors	-Refer to section 3.3.2.
9	Chart setup	-Refer to section 3.4.
0	Cursor to center	-Refer to section 3.3.2.
GOTO	Select NAV mode	-Refer to section 3.3.8.
PLOT	Plot new data	-Refer to section 3.3.9.
PAGE	More user data	-Inactive function.
MENU	Exit	-Exit info window.

1 *Edit user data* opens for a new info window:

Target		
1	Edit	Change the name, color, position, etc.
2	Move	Move target with cursor, and press [ENT].
CLR	Delete	Delete target ? “YES” / “NO”.
MENU	Exit	Exit info window.

3.3.8 GOTO function

CHART GOTO

Shortcut to Chart 1, press again *to call up INFO window* with available navigation modes:

Select NAV mode	
1	Cursor
2	Waypoint
3	Route
4	Track
5	Anchor guard
MENU	Exit

To select "Cursor" navigation will require that the cursor is active.
"Waypoint", "Route" and "Track" navigation will require there is one stored in the memory before it can be activated.
The NAV mode can also be activated from the NAV menu.

For further details on the different NAV modes, refer to chapter 4. Waypoints and navigation.

Anchor guard – When setting anchor, check/change the preset alarm distance etc., so you will be warned in case you drift too far from the anchored position. The alarm distance can be set anywhere from 0.01 to 9.99 nm in Navigation setup display. See also section 6.3 Anchor guard.

If pressing the [GOTO] key while one of the NAV modes is active, this pop-up window will appear on the screen:

Navigation is ON	
1	Advance
2	Restart to approaching point
3	Turn NAV off
MENU	Exit

Press [1] to advance to next waypoint in the route (Route navigation).
Press [2] if you for some reason have drifted off course and wish to restart navigation from your actual position to the approaching point.

3.3.9 PLOT function

The CRXX is designed to make navigation easy and safe. Making routes, drawing lines and plotting waypoints, etc. are all done directly on the chart. Very straightforward and uncomplicated.

The PLOT function is available from various displays as indicated below.

PLOT With any other display than chart in active window, *press* [PLOT] *to insert ship's/cursor's position as waypoint*

PLOT With chart in active display, press [PLOT] to *call up an INFO window* with the following to choose from:

PLOT new data	
PLOT	Plot eventmark - ship
1	Plot waypoint - cursor
2	Insert waypoint - ship
3	Insert waypoint - cursor
4	Make route
5	Draw line
6	Plot target - cursor
MENU	Exit

PLOT From any display:
Plot and save ship's position as a waypoint including actual depth.

1 From active chart display with cursor ON:
Plot and save cursor position as a waypoint.

2 From active chart display:
Plot and save ship's position as a waypoint including actual depth; insert a location name (cf.section 2.6), adjust the position by keying in new figures, change the symbol (cf.section 2.5).

3 From active chart display with cursor ON:
Plot and save cursor position as a waypoint; insert a location name (cf.section 2.6), adjust the position by keying in new figures, change the symbol (cf.section 2.5).

4 From active chart display with cursor ON:
You can quickly make a route by plotting cursor's position, one after another i.e. the present cursor position will be the first position of the route you are about to make. Move cursor to next position, and press [PLOT]. Continue in this manner till the route is completed. In case you make a wrong plot, press [CLR] to erase the last plotted position.
Save the route with [ENT] or exit the function with [MENU] to abandon the route.

5 From active chart display with cursor ON:
To draw lines or to make a route is the same procedure, please refer to point 4.

6 From active chart display with cursor ON:
Plot target at cursor position with preset target name, etc.

From chart display with cursor OFF:
The ship's position will be plotted as target.

After plotting the target it will be saved in the memory, and you can edit the target later on, either via the menu or directly from the chart:

Place cursor on the target symbol and press [ENT] to open an info window with the heading "Target found". Press [1] Edit user data to open for new options of editing i.e. move target, delete target, alter the position, insert a location name (cf.section 2.6) or select a new color for the target number and symbol (cf.section 2.5).

☞ See also target display in section 5.7.

3.4 Chart setup

CHART GOTO *Hotkey to Chart 1*

ENT 9 With chart 1 or chart 2 in active window, press [ENT], [9], to *load the chart setup* for the selected chart (1 or 2)

Chart setup

Land settings		Chart area	SMALL
Natural features	ON	Orientation	NORTH UP / TRUE
Natural features rivers	ON	Rotation resolution	5°
Cultural features	ON	Depth	
Landmarks	ON	Level 1	0 - 002m
Marine settings		Level 2	2 - 006m
Tides, currents	ON	Level 3	6 - MAX
Depths	ON	Grid	AUTO
Soundings	ON	Show scale	WITH BACKGROUND
Nature of seabed	ON	Auto chart select	OFF
Naval aids settings		Extended level range	ON
Ports	ON		
Caution areas	ON	Non active waypoints	ON
Tracks, routes	ON	Waypoint names	ON
Lights	ON	Waypoint depths	ON
Buoys	ON	Non active routes	AS SELECTED
Signals	ON	Route names	ON
Paper chart settings		Non active tracks	AS SELECTED
Names	ON	Track names	ON
Compass distance	ON	Lines	AS SELECTED
Chart settings		Line names	ON
Chart	NORMAL	Targets	AS SELECTED
Landfilling	ON	Target names	ON
Boundary lines	ON		

The settings are dedicated to the chart in the active window and does not affect the second chart. This enables simultaneous viewing of a very detailed chart and a less detailed chart.

ENT *Confirm changes and return to chart, or…*

MENU *abandon Chart setup and return to chart without making any changes*

All C-MAP feature groups i.e. Land settings, Marine settings, Naval aids settings and Paper chart settings are described in Appendix C.

All user data in the CRXX system are described below.

To obtain a "cleaner" view of the chart details, you can turn some of the settings OFF if they do not contribute to the clarity of the chart area you wish to explore. All the listed objects that can be turned on and off speaks for themselves – they are either "shown on the chart" or "not shown on the chart".

Chart settings

Chart can be set to NORMAL, COMPRESSED and CHART OFF:
NORMAL - will show the normal amount of details in the selected chart scale.
COMPRESSED - will ordinarily provide more details in the same scale.
CHART OFF - will only show all the user-made data such as waypoints, routes, lines and tracks, etc.

Landfilling can be ON or OFF. When OFF there will be no special color to indicate where the land on the chart is (if any) i.e. land will be all blue.

Boundary lines will indicate available C-MAP chart areas.

Chart area can be set to LARGE, MEDIUM or SMALL:
LARGE – Opens a large chart area for pan and scroll. Chart re-draw time is standard.
MEDIUM – Opens a medium-size chart area for pan and scroll. Chart re-draw time is faster than standard.
SMALL – Opens a small chart area for pan scroll. Chart re-draw time is the fastest.

Orientation can be set to NORTH UP, HEAD UP or NAV UP, and the mode can be RELATIVE or TRUE motion.
NORTH UP – The chart will always be presented as north up.
HEAD UP – The chart will automatically turn, so your actual course (COG) is up. If a compass is connected, the reference will automatically change to heading (compass).
NAV UP – The chart will automatically turn, so your bearing to destination is up.
☞ To enable chart rotation, the chart cursor must be turned off [CLR].

TRUE motion – The 'ship' will move across the chart.
RELATIVE motion – (*Chart area* will default to MEDIUM). The 'ship' is locked to the center of the screen and the chart will move.

Rotation resolution can be set to adjust the chart for each 5, 10, 15, 20 or 25° changes in present course or heading.

Depth – Level 1, 2 and 3 are identified by different colors. The number of meters in the levels can be changed. The colors are preset in the Palette setup, section 8.2.6.

Grid the LAT/LON grid can be set AUTO/ON/OFF. The color of the grid is preset in the Palette setup, section 8.2.6.

Show scale ON will add a small line to the chart display indicating that the length of the line equals a certain number of nautical miles/km.

Auto chart select When sailing with "Auto chart select" ON and cursor turned OFF, the scale will automatically change to the chart which is available. But when set to OFF, then the selected scale will remain, also when sailing "out of the chart".

Extended level range ON will provide a higher level of chart details when zooming in and out of scales.

The rest of the objects in the chart setup, from *Non active waypoints* and down to the last line *Target names* can all be:
ON = shown on chart or
OFF = not shown on chart, or
AS SELECTED = which means that the choice of having a certain route shown on the display can be made via the menu e.g. [MENU], [3] WP/RTE, [2] Routes and [ENT] – where Course line can be set ON or OFF.

4. Position menu

2 POS	
1 Position	- see section 4.1.
2 Set & drift	- see section 4.2.
3 Speed diagram	- see section 4.3.
4 Dual speed	- see section 4.4.
5 Wind	- see section 4.5.
6 MOB position	- see section 4.6.
7 Satellites	- see section 4.7.
8 DGPS	- see section 4.8.
9 DSC alarm	- see section 4.9.

4.1 Position display

MENU *Load menu bar, and…*
2,1 *load Position display*

Indicates the datum currently selected.

Datum 000 WGS 1984	Log 1 1.1nm	Log 2 1.1nm
LAT 56°52.500N LON 9°50.700E		
Speed 0.4kn	Course 17°	Compass °
Status DGPS a	UTC time 8:02:43	UTC date 12-02-2001

Trip log 1 and 2.

Position with three decimals in minutes.

Speed indicates Speed over ground.

Course, magnetic or true.

Depth or *Compass* from external sensor.

UTC or local time and date
Time and date in UTC – Universal Time Coordinates – is equal to standard time in London (GMT). UTC is not affected by the local summertime adjustments.

Status indicator for reception of satellites:
a(A)= good, b(B)= acceptable, c(C)= fair, or *= no update - see also "Status indicator and accuracy" below.

With DGPS receiver built-in or connected:
dGPS= differential data received.
DGPS= corrected differential data received.

Status indicator and accuracy
Small letters (a,b,c,) indicate that SA is active, and the position accuracy is expected to be better than 100 meters in 95% of the time.
Capital letters indicate that SA is OFF, and the position accuracy is then expected to be 15 meters or better in 95% of the time.
dGPS indicates that differential data is received, either via built-in differential receiver or from external receiver.
And DGPS indicates that the position is corrected by the differential data. The accuracy will typically be 3-5 meters.

In order to utilize the high accuracy of the GPS system, it is necessary to align the lat/long calculations to the paper charts you are using. Refer to Position setup display on next page.
☞ When using C-MAP electronic charts, the datum will be aligned automatically.

Position setup

ENT From position display, press [ENT] *to load Position setup*

Datum 000:		World Geodetic System 1984
Reset log:		
Log 1:		00001.1nm
Log 2:		00001.1nm
Display POS as:		LAT/LON
Delta position:	0°00.000N	0°00.000E
Start position:	Lat 56°52N	Lon 009°50E
Speed and course filter level:		3
Display speed as:		SOG
Course and bearing as:		MAGNETIC
Altitude mode:		AUTO
Manual antenna altitude:		+005 m
Display depth in position display:		NO
Time:		UTC
Time: 08:06:01	Date:	12-02-2001

● *Go to the function you wish to change*

CLR *Reset log*

0-9 *Key in new values, or…*

+/- *Toggle between available values*

ENT *Confirm editing and return to Position display*

Datum – is preset to WGS 1984 (World Geodetic System 1984), but can be changed to any of the 118 datums listed in Appendix B e.g. to match old paper charts or trackplotter data from RS2500/RS4000 (datum #002 European 1950).
The position in the position display and NMEA output (GLL + GL2) will refer to the selected datum. To select a new datum: Place the cursor next to "Datum" and leaf through the datum list with +/-, or key in the number.
☞ The datum in the chart display is fixed i.e. WGS84.

Reset log – or insert alternative start figure by altering the value in the "Log 1" and/or "Log 2" line. Press [CLR] to reset the figure, and press

the numeric keys 0-9 to alter the figure.

Display position as – the position can be shown in latitude/longitude, Loran C or decca coordinates (after selecting chain). Toggle with +/-.

Delta position – some paper charts do not indicate a datum, but instead they have a notation to an offset or delta position to WGS84.
Use numeric keys to key in the position correction.

Start position – can be inserted if exact start position is known.

Speed and course filter level – there is a speed and course filter of 10 steps available (0= fast response, 9= stable readout).

Display speed as – SOG Speed Over Ground or STW Speed Through Water. Toggle with +/-.
☞ to receive STW information from external instrument (via NMEA port) will require that NMEA sentence VHW and "Log speed sensor" are set to ON in. Refer to section 8.2.1 and 8.2.2.

Course and bearing – readings of course and bearing can be made in either MAGNETIC or TRUE. Toggle with +/-.

Altitude mode – is preset to automatic, but can be changed to manual. Toggle with +/-.

Manual antenna altitude – is preset to 5m. Insert actual antenna height if manual altitude mode is selected. This value will not be shown anywhere else, but will be used for computations.

Display depth in position display – if set to YES, then the depth will be shown when NMEA depth data is received from connected depth instrument.
When set to NO, then "Compass" from connected sensor (compass) will be shown instead.

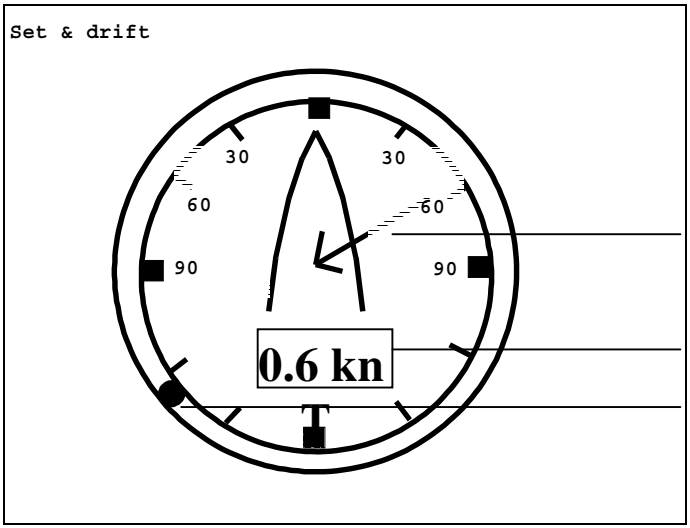
Time – can be set to UTC or local. Toggle with +/-.
Correct actual time and date by means of the numeric keys.

4.2 Set & drift

☞ The readings rely on data from external log and compass.

MENU
2,2

Load menu bar, and…
load display for "Set & drift"



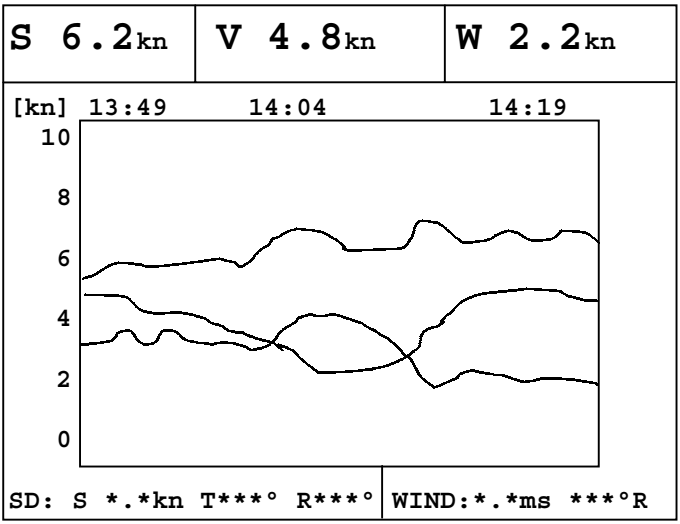
The set & drift display will show how fast the current is moving in knots; in what direction (true) it is moving and what direction in relation to the vessel (relative).

☞ To obtain information on actual and mean speed, velocity and water speed – see the "Set & drift trim display" in section 6.2.5.

4.3 Speed diagram

MENU
2,3

Call up the menu bar, and…
load "Speed diagram"



S= Speed over ground.

V= Velocity towards waypoint.

W= Speed through water.

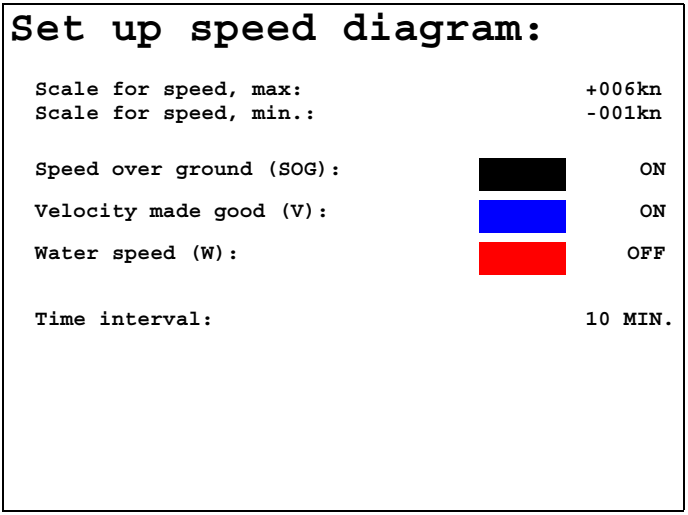
SD (Set and drift)*= Speed and direction, true or relative.

WIND*= Speed and direction.

** Connection to external sensors is required.*

ENT

Call "Speed diagram setup"
- see next page


Set up speed diagram:
Scale for speed, max: +006kn
Scale for speed, min.: -001kn
Speed over ground (SOG): ON
Velocity made good (V): ON
Water speed (W): OFF
Time interval: 10 MIN.

The scale for the speed diagram can be adjusted in this display.

Time interval can be set in 8 intervals from 1 minute to 3 hours and freeze.

Go to the function you wish to change

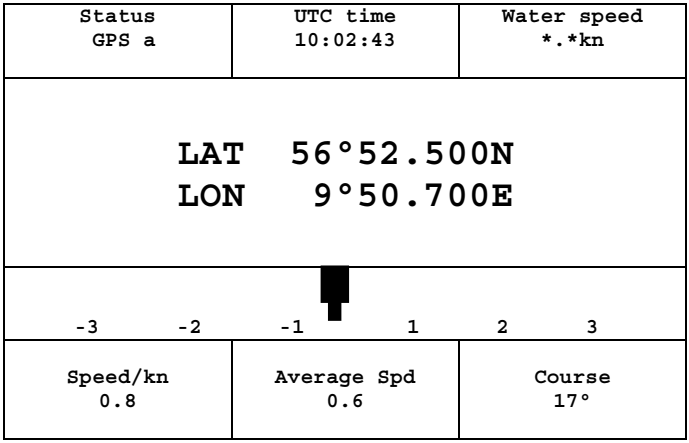
+/- *Key in new figure or change setting*

ENT *Confirm entry and return to Speed diagram*

4.4 Dual speed display (trawling speed display)

The analogue differential speed indicator will show how much the present speed varies from the average speed.
If the difference exceeds +/- 3 knots (or km/h or miles/h), an arrow will appear which will be pointing out of the scale.

MENU *Call up the menu bar, and…*
2,4 *load dual speed display*
- see next page.



Water speed readout from connected log transducer.

Position with three decimals in minutes.
Analogue differential speed indicator (scale).
Course over ground, magnetic (m) or true (°).

Average speed with long filtering time gives a very stable reading.

Dynamic speed with short filtering time is reacting quickly to changes, but is also more unsteady.

How to reset dual speed:

ENT *Open for change*

ENT *Press* [ENT] *to reset dual speed, or…*

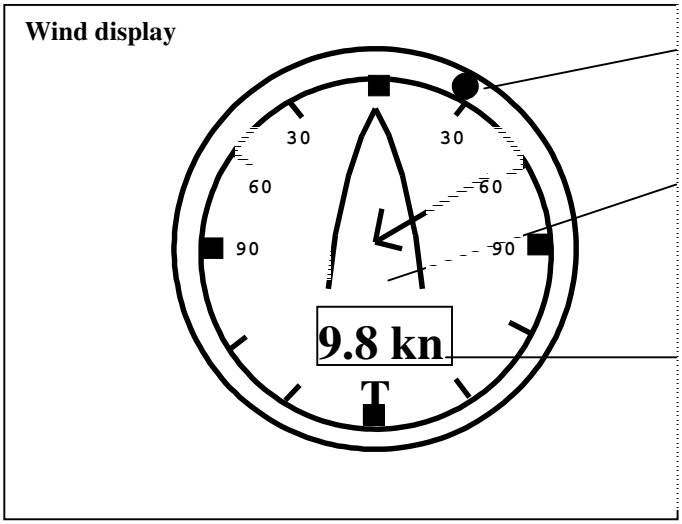
MENU *Press* [MENU] *to exit function without making any changes*

4.5 Wind display

The CRXX is ready to present depth, temperature, and wind data from installed transducer and connected compass.

Wind data – the "wind instrument" can provide both wind direction and wind speed, and the readings can be shown in relative or true (when the data is supplied from connected wind instrument).

MENU *Call up the menu bar, and…*
2,5 *load the "Wind instrument" display*



ENT *Load "Wind configuration" display*

Wind configuration:

Damping level:	LOW
Relative wind scale:	NORMAL
Wind angle offset:	000°
Show wind speed as:	RELATIVE
Wind speed unit:	METERS/SECOND

The settings available for each function are described on the next page.

● *Go to the function you wish to change*

+/- *Toggle between settings, or…*

0-9 *key in new figure*

ENT *Confirm entry and return to Wind display*

Damping level – can be set to LOW, MEDIUM or HIGH. The higher level the more steady and slow reacting reading.

Relative wind scale – can either be set to NORMAL (0-180°) or MAGNIFIED (0-60°).

Wind angle offset – can be from 0 to 360°.

Show wind speed as – TRUE or RELATIVE.

Wind speed unit – can be either METERS/SECOND, KNOTS, KILOMETERS/HOUR or MILES/HOUR.

4.6 MOB position

MENU *Call up the menu bar, and…*
2,6 *load MOB position display*

MAN OVERBOARD	
DATE	12-02-2001
TIME	14:23:34
MOB	56°52.489N
POS	009°50.305E

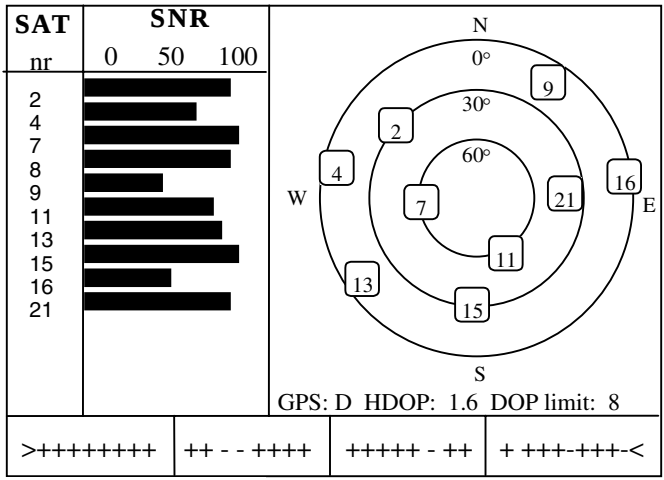
The MOB display will provide information of the last activated MOB position.

To delete a MOB track from the memory, see section 3.3.6.

4.7 Satellite status

MENU
2,7

Call up the menu bar, and…
load satellite status display



The display will show which satellites are currently being used for computation of data. It will show their position together with SNR – Signal to Noise Ratio. The bottom line shows the status of all the satellites in the GPS system, starting from left to right with the numbers 1 to 32, or the legend: No almanac.

Satellite status (bottom line):
+ indicates the satellite is healthy
- excluded or non-existing satellite
0 satellite data is faulty
* satellite is manually excluded

You may want to exclude a satellite manually in case a particular satellite is disturbing the navigation.

ENT

Open for change, and…

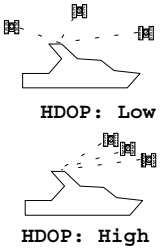
Place the cursor on the satellite in the bottom line you wish to exclude

- *The minus key will exclude the satellite, and…*
+ *the plus key will reinstate it*
- these two plus and minus keys are also the ZOOM keys!

ENT *Confirm entry*

HDOP, PDOP and DOP limits:

MENU *Call up the menu bar, and…*
2,7 *load satellite status display*



The value of HDOP (horizontal dilution of precision) expresses "the quality" of the satellite geometry in relation to 2D positioning and a fixed antenna altitude.

PDOP (position dilution of precision) is equivalent to 3D positioning. The values will typically stay between 1.3 and 8. The lower the value the higher the "quality". A poor geometry might produce a value of more than 20.

If the preset DOP limit is exceeded (indicated by * in the position display) it will cause the position updating to stop until it once again is within the limit.

The DOP limit can be changed manually, but should not be set to higher than 8 (factory set-up), as this may result in poor accuracy – false position.

ENT *Open for change*

● *Go to DOP limit (6-99), and…*

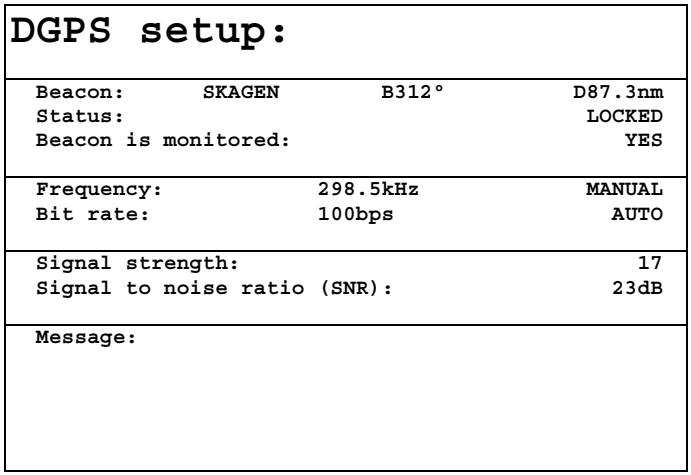
0-9 *Insert new limit*

ENT *Confirm entry*

4.8 DGPS setup

The DGPS – differential position corrections – can be provided from a built-in module, which is preset to full automatic operation, or from connected DGPS receiver – see 'Status indicator' in position display.
☞ List of beacon stations is available in addendum, part no. 183.0122.501.

MENU
2,8
Call up the menu bar, and…
load DGPS setup display (with built-in module)



To receive valid differential data will require that the navigator is locked in on a beacon station.

ENT
Open for change, and…

Go to the function you wish to alter

+/-
0-9
Toggle the function, or…
insert new figures

ENT
Confirm entry

Beacon – informs the name of the beacon the navigator is locked on to (if any), together with indication of bearing and distance.

Status – can either be:
LOCKED = locked on a beacon and receiving differential data.
NOT LOCKED = not locked on a beacon and receiving no differential data.
NOT INSTALLED = there is no built-in DGPS module in unit.
NOT IN USE = external DGPS receiver applied.

Beacon is monitored – YES or NO.
If YES it should be safe to rely on the received differential data, because the beacon station's performance is under observation.
If NO, then you have to use the received differential data with caution, as there is no guarantee it is not faulty.

Frequency – the frequency of the beacon station can be set manually if known. However, when left in AUTO the navigator will always search for the nearest station with a good signal strength.

Bit rate – indicates *bits per second,* and can be set manually to 25, 50, 100 or 200 bps.

Signal strength – a good signal strength is 20 and up.

Signal to noise ratio (SNR) – should be 8dB and up.

Message – type 16 message will be displayed when received from the DGPS system. The contents of this message could be something to do with the performance of the system. Temporarily out of service, etc.

4.9 DSC alarm (feature prepared for future DSC VHF)

☞ To receive a DSC Alarm and Message from VHF will require that the chartplotter is connected to a compatible Simrad Shipmate VHF radiotelephone, which is expected to be launched in the beginning of year 2001.

The message from the VHF will appear in a pop-up window together with an acoustic alarm. Press [CLR] to reset the alarm.

To view the last received message:

MENU
2,9

Call up the menu bar, and…
press [2] *and* [9] *to call up the message display*

5. Waypoint / route menus

3 WP/RTE	
1 WP list	- see section 5.1.
2 Routes	- see section 5.2.
3 Route calculation	- see section 5.3.
4 Lines	- see section 5.4.
5 Start track	- see section 5.5.
6 Stop track	- see section 5.5.
7 Tracks	- see section 5.6.
8 Targets	- see section 5.7.
9 Data transfer	- see section 5.8.

5.1 WP list (waypoints stored in the memory)

MENU *Call up the menu bar, and…*
3,1 *load WP list*

The waypoint list will appear in alphabetical order and will include the waypoint's position in lat/long. To edit one of the stored waypoints:

A-Z *Insert name of waypoint you wish to edit*

ENT *Press* [ENT] *to open for editing*

● *Place the cursor on the function you wish to change*

0-9 *Key in new figures, or…*
+/- *toggle between available values*

PLOT *Press* [PLOT] *to move the position to ship's position, or…*

ENT *Confirm entry and return to WP list*

☞ Plot new waypoints with the [PLOT] key. Refer to section 3.3.9.

5.1.1 Delete waypoints via menu

MENU *Call up the menu bar, and…*
3,1 *load WP list*

+/- *Select waypoint you wish to delete*

ENT *Press* [ENT] *to open for editing*

WIN *Press* [WIN] *to delete waypoint*

CLR *Confirm entry and return to WP list*

☞ Edit waypoints directly on the chart via info windows. Refer to section 3.3.3.

5.2 Routes stored in the memory

The route list will keep a record of all the saved routes in the system. It will provide information on number of waypoints in the route, etc.

☞ To make new routes you need a chart in the active window, place the cursor where you wish to place the first routepoint, and press [PLOT]. Then follow the instructions in the info windows. Refer to section 3.3.9.

To delete a route, refer to section 5.2.1.

Routes can also be edited directly on the chart via info windows. Refer to section 3.3.4 and 3.3.5.

MENU *Call up the menu bar, and…*
3,2 *load route display*
- see example next page.

Route: RTE 37				0005
Course line:		———		ON
XTE line:		------		OFF
1:	RHUMBLINE	153°	43.2nm	43.2nm
2:	RHUMBLINE	219°	2.9nm	46.1nm
3:	RHUMBLINE	34°	34.8nm	80.9nm
4:	RHUMBLINE	234°	113.4nm	194.3nm
5:	RHUMBLINE	79°	0.2nm	194.5nm
6:	RHUMBLINE	112°	23.9nm	218.4nm
7:	RHUMBLINE	315°	10.8nm	229.2nm
8:	RHUMBLINE	279°	2.3nm	231.5nm
9:	RHUMBLINE	5°	13.2nm	244.7nm
Number of points in route:				25

This display indicates how many route points are in the route, etc.

+/- *Toggle through the stored routes with the +/- keys, or…*

A-Z *Select route by entering its name (existing route)*

Move the cursor up/down to select a specific routepoint

ENT *Call up the Edit route display* – if you wish to make any changes.

Edit route:			
Settings for total route:			
Name:	RTE 37		
Course line:		———	ON
XTE:	0.10nm	------	OFF
Navigation mode:			RHUMBLINE
Settings for route leg:			5 – 6
XTE:			00.10nm
Navigation mode:			RHUMBLINE
Direction in route:			FORWARD
Show route as:			NAVIGATION
		WIN	Delete
MENU	Exit	ENT	Accept

Turning “Course line” OFF in the Route display will make the route

invisible on the screen. Put it back on the screen by turning it ON again. The course line and XTE line can be changed in color – there are a total of 14 colors to choose from, and 9 different line types.

If the XTE distance is not the same in all legs, the value will be *.* instead of the 0.10nm. Navigation mode can be either RHUMBLINE or GREAT CIRCLE, or…. if not set to the same in all legs in a route, the mode will be: COMPOSITE.

Show route as: NAVIGATION for navigational data in the route display (example on the previous page), or POINTS for a list of route points together with the points' position in lat/lon and the XTE limit.

● *Place the cursor on the function you wish to change*

0-9 *Key in new figures, and…*
+/- *toggle between available values*

ENT *Confirm entry*

5.2.1 Delete route via menu

MENU *Call up the menu bar, and…*
3,2 *load route display*

+/- *Select the route you wish to delete*

ENT *Press* [ENT] *to open for editing*

WIN *Press* [WIN] *to delete route*

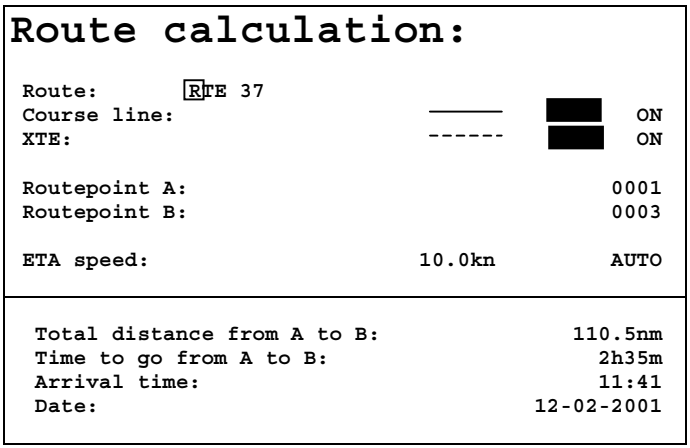
CLR *Confirm*

☞ Edit routes directly on the chart via info windows. Refer to section 3.3.4 and 3.3.5.

5.3 Route calculation

To stay well informed during navigation, the Route calculation display will provide information on how long it takes to go from one point to another, total distance, arrival time, etc.

MENU *Call up the menu bar, and…*
3,3 *load route calculation display*



+/- *Toggle between available routes in the memory*

● *Go to Routepoint A, and*

0-9 *Select the first route point (A) from where you wish to start the calculation in the route, and then select the second point (B)*

Present speed is automatically used for calculating the arrival time, but if required, an alternative speed can be inserted:

ENT *Open for change*
0-9 *and insert new speed value*

+/- *Toggle between AUTO and MANUAL*

ENT *Confirm entry*

5.4 Lines stored in the memory

The line list will keep a record of all the saved lines in the system. It will provide information on number of line sections in line, etc.

"Lines" are used for defining a certain area on the chart, e.g. a fishing ground, a shipwreck, large rocks, restricted areas, etc., or defining a channel to sail through narrow passages, making your own coast line or for whatever reason you could use a drawing on the chart.

☞ To draw new lines you need a chart in the active window, place the cursor where you wish to start the line, and press [PLOT]. Then follow the instructions in the info windows. Refer to section 3.3.9.
Lines can also be edited directly on the chart via info windows. Refer to section 3.3.4 and 3.3.5.

MENU
3,4

Call up the menu bar, and…
load line display
☞ Only plotted lines saved in the memory can be called forward.

```
Line:    FISHING BORDER                              0005
Line:                                                 ON

   1:                      56°52.700N     009°50.230E
   2:                      56°52.712N     009°50.431E
   3:                      56°52.723N     009°50.654E
   4:                      56°52.756N     009°50.760E
   5:                      56°52.856N     009°50.899E
   6:                      56°52.901N     009°51.232E
   7:                      56°53.230N     009°51.400E
   8:                      56°53.650N     009°51.432E
   9:                      56°53.897N     009°51.230E
  10:                      56°54.220N     009°52.110E

Number of sections in line:                       16
```

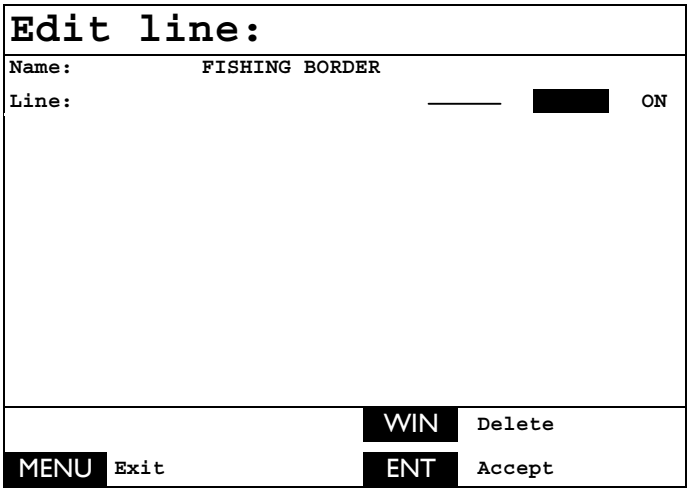
This display indicates how many line sections are used for the drawing.

+/-

Toggle through the stored lines with the +/- keys, or…

Leaf through the line points by moving cursor up/down

ENT *Call up the Edit line display* - if you wish to make any changes.



Turning "Line" OFF will make the line drawing invisible on the screen. Put it back on the screen by turning it ON again.

● *Place the cursor on the function you wish to change i.e. name, line type or color*

+/- *Toggle between available values*

ENT *Confirm entry*

5.4.1 Delete lines via menu

MENU *Call up the menu bar, and…*
3,4 *load line display*

+/- *Select the line you wish to delete*

ENT *Press* [ENT] *to open for editing*

WIN *Press* [WIN] *to delete the line*

CLR *Confirm*

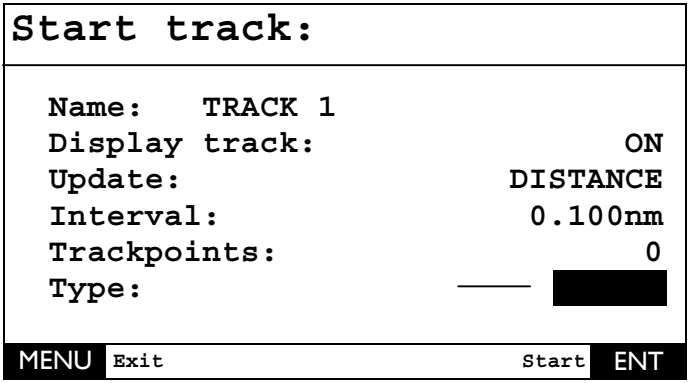
☞ Edit lines directly on the chart via info windows. Refer to section 3.3.4 and 3.3.5.

5.5 Start / stop track

The track function will provide a track trailing the movement of your ship. With a Simrad TL50 Turbo Loader + ARPA radar connected, you will also be able to track ARPA targets on the CRXX chart display - refer to the TL50 manual for further details.

To start track function from own ship:

MENU *Call up the menu bar, and…*
3,5 *load Start track pop-up window*



As default from the factory: The first track is stored as TRACK1, the next as TRACK2, etc.

If you wish to change the default values:
Move cursor to where you wish to make a change

+/- *Toggle between available values, or…*
0-9 *key in new values*

ENT *Start track by pressing* [ENT]

Name of track can be altered (max. 25 characters).

Display track can be set ON and OFF, where OFF will make it invisible on the screen. Turn ON to put it back on the screen.

Update of the track can be performed by distance in nautical miles, or by time interval.

Type of track line i.e. full, dotted, etc. has 9 different types to choose from in 15 different colors.

To stop track:

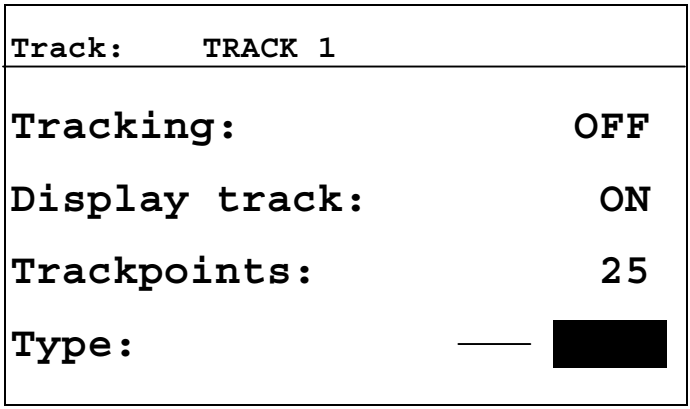
MENU *Call up the menu bar, and…*
3,6 *load Stop track pop-up window*

ENT *Press* [ENT] *to stop the highlighted track*

5.6 Tracks stored in the memory

All tracks (of more than 1 trackpoint) will automatically be stored in the memory. To see which tracks are registered, you can scroll through the list by:

MENU *Call up the menu bar, and…*
3,7 *load "Tracks" in active window*



As default from the factory: The first track is stored as TRACK1, the next as TRACK2, etc.

A-Z *Select name of track*
- or if a number is included in the track name, place cursor on the number, and …

+/- *Toggle up/down in the track numbers*

ENT *Open for change*

"Display track" can be set ON/OFF, where OFF will make it invisible on the screen. Turn ON to put it back on the screen.

+/- *Toggle between available values*

ENT *Confirm changes*

5.6.1 Delete tracks via menu

MENU *Call up the menu bar, and…*
3,7 *load track display*

+/- *Select the track you wish to delete*

ENT *Press* [ENT] *to open for editing*

WIN *Press* [WIN] *to delete the track*

CLR *Confirm*

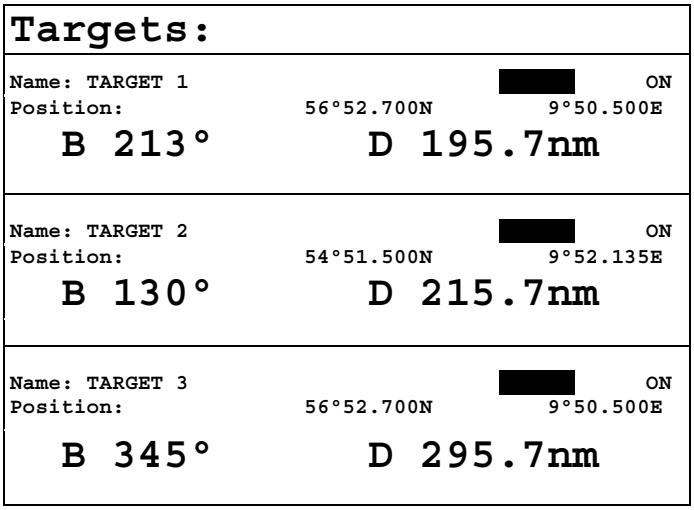
☞ Edit tracks directly on the chart via info windows. Refer to section 3.3.6.

5.7 Targets stored in the memory

The CRXX can display the bearing and distance of up to three targets at a time in relation to the vessel e.g. harbors or important navigational points. A target is a fixed point on the chart which can be plotted by the cursor or from the ship's position, or keyed in via the keypad.

Set up targets
The plotted target position is automatically preset to actual position of ship, or to cursor position when the chart display is active and the cursor is on – see INFO windows, section 3.3.7.

MENU
3,8 *Call up the menu bar, and… load target display*



Make the target invisible on the screen by turning it OFF.

Put it back on the screen by turning it ON again.

● *Select the target you wish to change or replace with a different target by moving the cursor up/down*

+/- *Leaf through the targets in the memory*

ENT *Open for change, and…*

● *Place cursor where you wish to make a change i.e. name, color, etc.*

A-Z
0-9 *Key in new values, alphabetical or numerical*

+/- *Toggle between available values*

ENT *Confirm entry*

5.7.1 Delete target via menu

MENU
3,8 *Call up the menu bar, and… load target display*

+/- *Select the target you wish to delete*

ENT *Press* [ENT] *to open for editing*

WIN *Press* [WIN] *to delete the target*

CLR *Confirm*

☞ Edit targets directly on the chart via info windows. Refer to section 3.3.7.

5.8 Data transfer via DataCard or disc

Data transfer *to and from* external memory can be performed via DataCard, or with a Simrad TL50 Turbo Loader: via an ordinary 1.44Mb disc.

DataCards and TL50 Turbo Loader are optional equipment available from you local Simrad dealer.
How to perform data transfers via TL50 Turbo Loader (inclusive data from Shipmate RS2500 Trackplotter) is described in the TL50 manual.

Use the Simrad DataCard or TL50 Turbo Loader to make backup files of all the user data you have created plus the current setups in the internal memory of the unit. Do it whenever you have added important data, or when you wish to transfer routes and waypoints, etc. to another compatible unit.
The storage capacity of the DataCard/TL50 disc is divided into two databanks of each 450 Kb, meaning that the entire internal memory can be stored in one databank.

• External memory with data transfer via DataCard:

MENU *Call up the menu bar, and…*
3,9 *load the 'Data transfer' window*

Select the drawer where you have inserted the DataCard i.e. [1] for the

upper drawer, and [3] for the lower drawer.

You now have a choice of:
[1] DataCard status
[3] Save on DataCard
[9] Load from DataCard

DataCard status

1 *Press* [1] *to find out what data (if any) is stored on the DataCard*
The capacity is divided into two databanks: DATABANK 1 and 2 which can hold approx. 2 x 450 Kb data. Toggle between the two databanks with the +/- zoom keys.

Save on DataCard

3 *Press* [3] *to call up a new INFO window* where you can see which data will be transferred i.e. how many routes, waypoints, etc. and how much space it will take up in bytes + percentage of max. storage capacity. Choose which databank you wish to transfer the data to (use the +/- zoom keys).
The actual date and time will be saved with the data transfer.
A name can be added for easy identification later on.

ENT *Press* [ENT] *to activate 'Save on DataCard'*

☞ You will now receive a warning that existing data on the DataCard, in the databank you have chosen, will be overwritten. You can not 'add more information' to data already transferred. Whenever transferring data either from an XX40/42/50 MKII to Databank 1 or 2 on DataCard, or from Databank 1 or 2 on DataCard to an XX40/42/50 MKII, the data package will replace the entire capacity in the receiving unit, except when a TL50 Turbo Loader is connected to the unit, then you can decide how much data you want to transfer - refer to TL50 manual.

Load from DataCard

9 *Press* [9] *to call up a new INFO window* where you can see which data is stored in Databank 1 or 2 on the DataCard - see example of display on next page, without TL50 connected.

+/- *Use the +/- zoom keys to toggle between DATABANK 1 and 2*

Load from DataCard: DATABANK-1		
Data generated by:		Simrad CR40
Used internal memory:		672 bytes = 0%
Used DataCard memory:		85332 bytes = 19%
Used internal memory after operation:		85332 bytes = 19%
Save date:		24-08-2000
Save time:		09:26:59
Name:	MR14	
Data type	Amount	Size [byte]
Marks/waypoints:	52	1120
Lines:	2	284
Routes:	8	6280
Targets:	3	72
Tracks:	5	75287
Setup:	1	2289
MENU Exit	Load from DataCard	ENT

ENT *Press* [ENT] x 2 *to transfer a copy of the data* in DATABANK 1 to the internal memory in the unit. Any existing data in the internal memory will be overwritten, except when a TL50 Turbo Loader is connected to the unit, then you can decide which data should be overwritten - refer to TL50 manual.

MENU *Press* [MENU] *to Exit, and reboot*

☞ When the system makes a 'reboot' the screen will turn black for a brief moment, then the system will re-start and automatically return to the active display which was on the screen before you made the transfer.

6.1 NAV menu – (NAV inactive)

4 NAV	
1 Navigation	- see section 6.1.1.
2 Waypoint	- see section 6.5.2.
3 Route	- see section 6.5.3.
4 Track	- see section 6.5.4.
5 Anchor guard	- see section 6.3.

This NAV menu will appear when there is no navigation mode active.

See also section **6.2** – when navigation mode is active, section **6.3** Anchor guard, **6.4** MOB navigation, and **6.5** Navigation examples.

6.1.1 Navigation display

MENU
4,1 *Call up the menu bar, and… load Navigation display*

Since there is no navigation mode active, you will receive the legend: NAVIGATION IS OFF. To enter the basic Navigation setup display:

ENT *Press* [ENT] *to call up Navigation setup*
- see display example next page.

The default settings in the navigation setup display can only be edited when the relevant navigation mode is active; except for the anchor alarm settings, which can be edited at any time.

```
Navigation setup:

Anchor alarm distance:                  00.50nm
WP circle alarm:                 00.10nm  OFF
WP and cursor navigation:
 XTE alarm:                      00.10nm  OFF
 Navigation mode:                   RHUMBLINE
Route navigation:
 XTE alarm:                             OFF
 Auto waypoint shift:               WP-circle
Track navigation:
 XTE alarm:                      00.10nm  OFF
 Auto trackpoint shift:               WP-line
 Navigation mode:                   RHUMBLINE
```

+/- *Toggle between available values, or…*
0-9 *key in a new alarm limit*

ENT *Confirm entry*

• With Anchor guard active or not:

Anchor alarm distance – When setting anchor, check/change the preset alarm distance etc., so you will be warned in case you drift too far from the anchored position. The alarm distance can be set to anywhere from 0.01 to 9.99nm. See also section 6.3 Anchor guard. The alarm will automatically reset once you are inside the limits again.

• With the related navigation mode active:

WP circle alarm – forms a circle around each waypoint, and the alarm distance can be set to anywhere between 0.01 and 9.99nm.
The waypoint alarm will be activated when you reach the circle or the perpendicular line – **WP line alarm** – crossing through the waypoint. When "Auto waypoint shift" is set to "WP-circle" it will override the "WP circle alarm" function.

XTE alarm – forms a corridor along the ideal track. When crossing one of the boundaries the XTE alarm will be activated.

The **alarm** will automatically reset once you are inside the limits again.

The alarm distance can be set to anywhere between 0.01 and 9.99nm.
☞ In Route navigation the XTE alarm value can be specified for each route leg – see section 5.2.

Navigation mode – RHUMBLINE navigation is used for shorter distances, and GREAT CIRCLE for long trips, especially when crossing at high latitudes. COMPOSITE navigation is used when not all legs in a route are set to the same navigation mode.

Auto waypoint shift – can be set to "WP-circle", "WP-line" or "OFF". When set to WP-circle, the system will change to the next waypoint in the route after passing the circle line (border).
When set to WP-line, the system will change to next waypoint in the route after passing the waypoint line (border).
When "Auto waypoint shift" is set to "WP-circle", then the alarm function at the waypoint's circle will not be activated.

6.2 NAV menu – (NAV active)

4 NAV	
1 Navigation	- see section 6.2.1.
2 Turn NAV off	- see section 6.2.3.
3 ETA & AVN	- see section 6.2.4.
4 Set & drift trim	- see section 6.2.5.
5 WP advance	- see section 6.2.6.

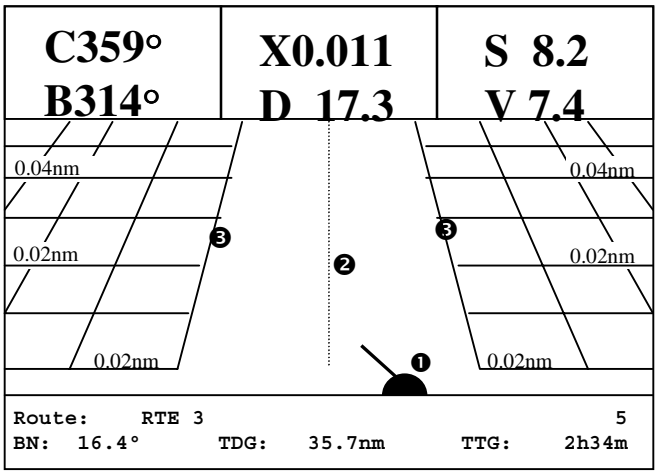
This NAV menu will appear when navigation mode is active.
If the selected navigation mode is Waypoint navigation, then point 5:Waypoint advance will not be available and therefore the color of the text will differ from the rest of the menu text.

See also section **6.1** NAV menu – (NAV inactive), section **6.3** Anchor guard, **6.4** MOB navigation, and **6.5** Navigation examples.

6.2.1 Navigation display

MENU
4,1
Call up the menu bar, and…
load Navigation display

With navigation mode active, the navigation display will provide a graphical steering display (highway):



C: Course over ground
X: XTE – Cross-track-error
S: Speed over ground
B: Bearing to approaching point
D: Distance to approaching point
V: Speed towards point
Route: Name of active route
Point: No. of approaching point
TDG: Total distance to go
BN: Bearing to next point
TTG: Time to go (only for waypoint navigation).

❶ Ship's position and course in relation to intended track.

❷ Intended track between two waypoints or from ship's position when NAV is activated.

❸ XTE alarm lines – an alarm will be activated if the ship moves across the lines (if the alarm is enabled).

Refer to section 6.1.1 for alarm setup.

6.2.2 Navigation setup

If you wish to make any changes in the navigation setup, you can quickly enter the navigation setup display by pressing [ENT] from the navigation display (graphical steering display).

ENT *Quick access to navigation setup from active navigation display, or…*
-refer to display example and description of functions in section 6.1.1.

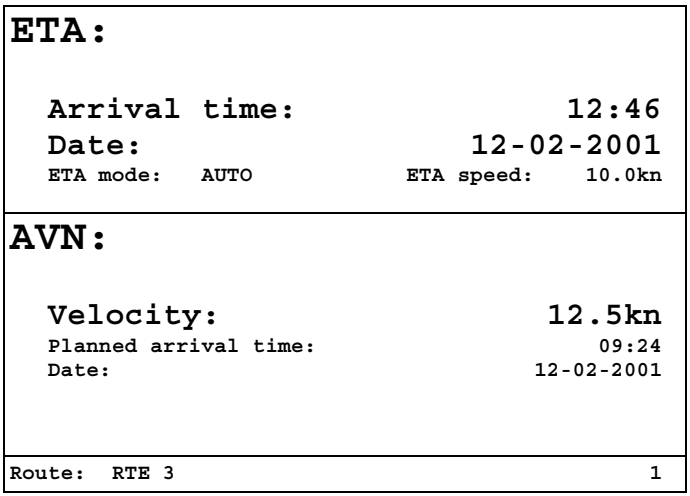
6.2.3 NAV mode – Turn NAV off

MENU *Call up the menu bar, and…*
4,2 *turn off navigation mode*

6.2.4 NAV mode – ETA & AVN

☞ Navigation mode must be active to call up the ETA & AVN display.

MENU *Call up the menu bar, and…*
4,3 *load the ETA & AVN display*



ETA – Estimated Time of Arrival - refers to the inserted local time, and can be calculated to any point used for navigation.

AVN – Approximate Velocity Necessary – is automatically calculated in knots after you key in the planned arrival time and date.

In route navigation the approaching point and present speed over ground (AUTO) is automatically used for the calculation.

You can change to any waypoint in the route and also insert an alternative ETA speed (MANUAL).

ENT *Open for change* – in route navigation the approaching point is automatically suggested and present speed is used for calculation.

● *If required – go to, and…*

0-9 *Insert alternative routepoint* – only in Route navigation.

● *Go to ETA mode, and…*

+/- *Select* AUTO *or* MANUAL

● *Go to AVN, and…*

0-9 *Insert time and date*

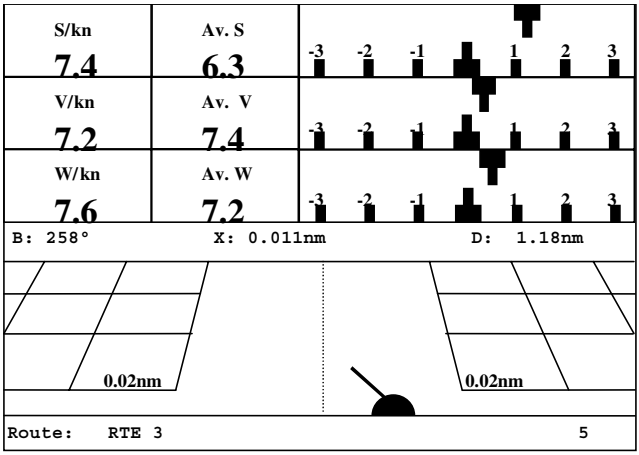
ENT *Confirm entry*

6.2.5 NAV mode – Set & drift trim display

☞ The readings rely on data from external log and compass, and navigation mode must be active.

The Set & drift trim display will provide information on actual and mean speed, velocity and wind.
- see also section 4.2 Set & drift display.

MENU
4,4
Call up the menu bar, and…
load the Set & drift trim display



X: XTE Cross-track-error.

D: Distance to point.

ENT
Open for change

ENT
Reset mean speed indication in display

6.2.6 NAV mode – Waypoint advance

MENU
4,5
Call up the menu bar, and…
activate shift to next waypoint
- it will require that navigation mode is active and that "a next waypoint" exists.

6.3 Anchor guard

MENU *Call up the menu bar, and…*
4,5 *activate the anchor guard function*
- the chart display will provide an impression of the vessel's position in relation to the alarm circle.

To check/change the preset alarm distance:
MENU *Call up the menu bar, and…*
4,1 *load the navigation display*

ENT *Press* [ENT] *to call up the navigation setup display*

Move cursor to the Anchor alarm distance

0-9 *Enter new value with numeric keys*

ENT *Confirm the change*

To turn Anchor guard off again:

MENU *Call up the menu bar, and…*
4,2 *turn anchor guard off*

6.4 MOB navigation

The MOB – Man overboard – display will be activated if you press the blue [MOB] key on the CRXX keypad and hold it depressed for two seconds, or activate an external MOB switch. The MOB display will provide all relevant data for an efficient rescue operation – see display examples on the rear of the front page.

To turn the MOB function off again:

MENU
4,2

Call up the menu bar, and…
turn the MOB function off

To check the last activated MOB position:

MENU
2,6

Call up the menu bar, and…
select MOB position

6.5 Navigation examples

Relevant for all navigation modes are:
- the navigation display with graphical steering – section 6.2.1.
- the ETA & AVN display with Estimated Time of Arrival and Approximate Velocity Necessary to reach a given point at a specific time – section 6.2.4.
- the *Set & drift display with indication of how fast the current is moving in knots, in what direction (true) it is moving and what direction in relation to the vessel (relative) – section 4.2
- the *Set & drift trim display with information on actual and mean speed over ground, velocity (VMG) and water speed – section 6.2.5.

* These readings rely on data from external log and compass.

6.5.1 Chart/cursor navigation. 6.5.2 Waypoint navigation.
6.5.3 Route navigation. 6.5.4 Track navigation.

6.5.1 Chart/cursor navigation

Cursor navigation is the easiest and most straightforward way of navigation – *point and go.*

CHART

Shortcut to chart 1 display
Press the cursor key to activate the cursor, then move the cursor to your destination

GOTO
1

Call up "Select NAV mode" window, and…
select "Cursor"

A course line will now be drawn from actual position (ship's position) to destination point (cursor's position).

Next destination: While on the way, you can easily *move the cursor to the next destination*, and when ready to change navigation leg…

GOTO
2

Press [GOTO] *and* [2] *to…*
"Restart to approaching point"
- A new course line will be drawn from ship's position to destination.

It is possible to mix and match the data you require to have on the screen e.g. ½ window for the chart display, ¼ window for the navigation display, and ¼ window for the Set & drift trim display, maybe. The choice is yours. Refer to section 2.1 Fundamentals of the PAGE and WINdow system.

To turn NAV mode off again:

GOTO
3

Press [GOTO] *and* [3] *to…*
"Turn NAV off" from active chart display
or…

MENU
4,2

Press [MENU] *and* [4], [2] *to…*
"Turn NAV off" via the menu

6.5.2 Waypoint navigation

There are two ways of activating Waypoint navigation:
From the chart or from the menu.

From the chart:

CHART *Shortcut to chart 1 display*

● *Press the cursor key to activate the cursor, then move the chart cursor to your destination waypoint* (or select it from the WPlist - see below)

GOTO *Select NAV mode, and…*

2 *Select Waypoint from WPlist* (if chart cursor is placed on a WP, this WP will be highlighted in the WPlist.

This will activate the pop-up window 'Navigate to WP' - now follow the procedures from the ☞ a few lines down.

From the menu:

MENU *Call up the menu bar, and…*
4,2 *select "WP" in Navigation menu*

☞ This will activate the pop-up window "Navigate to WP" from where you can choose which waypoint you wish to sail to:

● *Use the cursor to scroll up/down in the waypoint list, or place cursor on the WP number, and…*

+/- *Scroll up/down with +/- keys, or…*

0-9 *Key in the number of the waypoint you wish to sail to*

ENT *Start navigation*

A course line will now be drawn from ship's position to destination waypoint.

It is possible to mix and match the data you require to have on the

screen e.g. ½ window for the chart display, ¼ window for the navigation display, and ¼ window for the Set & drift trim display, maybe. The choice is yours. Refer to section 2.1 Fundamentals of the PAGE and WINdow system.

To turn NAV mode off again:

GOTO
3
Press [GOTO] *and* [3] *to…*
"Turn NAV off" from active chart display with cursor on
or…
MENU
4,2
Press [MENU] *and* [4], [2] *to…*
"Turn NAV off" via the menu

6.5.3 Route navigation

To start Route navigation will require that at least one route is stored in the memory. Refer to section 3.3.9 PLOT function.

When navigating in a route, you will have a graphical steering display to navigate by, see section 6.2.1. Know your ETA – Estimated Time of Arrival, and your AVN – Average Velocity Necessary, see section 6.2.4. Call up the Set & drift display, see section 4.2.

There are two ways of activating Route navigation:
From the chart or from the menu.

From the chart:

CHART
Shortcut to chart 1 display

●
Press cursor key to activate the cursor

GOTO
Select NAV mode

3
Select Route (if chart cursor is placed on a route, this route will be suggested)

This will activate the pop-up window 'Navigate in route' - now follow the procedures from the ☞ a few lines further ahead.

From the menu:

MENU
4,3
Call up the menu bar, and…
select "ROUTE" in Navigation menu

☞ This will activate the pop-up window "Navigate in route" from where you can choose which route you wish to select for navigation:

+/- *Scroll up/down in the route list until the correct route number / name appears*

Use the cursor to move around in the window if anything needs to be changed – such as Direction in route, etc.

0-9 *Key in the number of the waypoint you wish to sail to*

ENT *Start navigation*

A course line will now be drawn from ship's position to the first waypoint in the route.

It is possible to mix and match the data you require to have on the screen e.g. ½ window for the chart display, ¼ window for the navigation display, and ¼ window for the Set & drift trim display or ETA & AVN display, maybe. The choice is yours. Refer to section 2.1 Fundamentals of the PAGE and WINdow system.

GOTO Pressing [GOTO] from chart display during navigation will *activate an INFO window* with the following functions to choose from:

1. Advance (to next waypoint in route)
2. Restart to approaching point (in case you have drifted off course)
3. **Turn NAV OFF.**

MENU
4
Pressing [MENU] and [4], from an active data display during navigation will give access to the following displays / feature:

1. Navigation display
2. **Turn NAV off**
3. ETA & AVN
4. Set & drift trim
5. WP advance

6.5.4 Track navigation

A track is created by a series of trackpoints connected by track lines. Using a track for navigation is somewhat like navigating in a route with many waypoints.

☞ To start Track navigation will require that at least one track is stored in the memory. Tracks which are not yet completed can not be used for navigation. Refer to section 5.5 Start / Stop track.

When navigating in a track, you will have a graphical steering display to navigate by, see section 6.2.1. Know your ETA – Estimated Time of Arrival, and your AVN – Average Velocity Necessary, see section 6.2.4. Call up the Set & drift display, see section 4.2.

There are two ways of activating Track navigation:
From the chart or from the menu.

From the chart:

CHART *Load chart display in active window, and…*

Press cursor key to activate the cursor

GOTO *Select NAV mode*

4 *Select Track* (if chart cursor is placed on a track, this track will be suggested).

This will activate the pop-up window 'Navigate in track' - now follow the procedures from the ☞ a few lines further ahead.

From the menu:

MENU *Call up the menu bar, and…*
4,4 *select "TRACK" in Navigation menu*

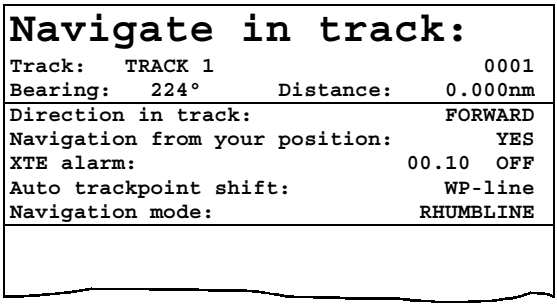
☞ This will activate the pop-up window "Navigate in track" from

where you can choose which track you wish to select for navigation:

+/- *Scroll up/down in the track list until the correct track number / name appears*

● *Use the cursor to move around in the window if anything needs to be changed* – such as Direction in track, etc.

0-9 *Key in the number of the first trackpoint you wish to sail to*
- see display example on next page.



ENT *Start navigation*

A course line will now be drawn from ship's position to the first point of destination.

It is possible to mix and match the data you require to have on the screen e.g. ½ window for the chart display, ¼ window for the navigation display, and ¼ window for the Set & drift trim display or ETA & AVN display, maybe. The choice is yours. Refer to section 2.1 Fundamentals of the PAGE and WINdow system.

GOTO Pressing [GOTO] from chart display during navigation will *activate an INFO window* with the following functions to choose from:

1. Advance (to next trackpoint)
2. Restart to approaching point (in case you have drifted off course)
3. **Turn NAV OFF.**

MENU
4

Pressing [MENU] and [4], from an active data display during navigation will give access to the following displays / feature:

1. Navigation display
2. **Turn NAV off**
3. ETA & AVN
4. Set & drift trim
5. WP advance

7. Radar operation

The CRXX combines chart plotting with radar navigation. For first time users of Radar, we have included a basic description of the radar presentation with a basic understanding of how the controls affect the radar's operation and display.

The following paragraphs describe the control settings used for initial display setup, turn-on procedure, inclement weather operation and finally the turn off procedure. Radar controls are described in chapter 7.2.

7.1 Radar map

The radar picture appearing on the display is a map-like representation of the area in which the radar is operating. Typically, the ship's position is at the center of the display. The operator may reposition or offset the ship's position up to 66% of the radius anywhere on the screen. The ship's dead ahead bearing is indicated by the heading line flashing at the 0° relative bearing with every revolution of the sweep trace (Head-Up mode).

Coastline contours and landmass are generally depicted in solid filled yellow (DAY) or green (NIGHT) echo areas. Other surface vessels, and channel buoys, are displayed as smaller single "pips" or echoes. The radar picture or map can be viewed in many different sizes or scales from own ship. These sizes are selected by the range scale controls. Greater detail of radar echoes nearby own ship is shown when the short or nearby range scales are selected. The best technique for assessing the radar presentation characteristics is to start with using a longer range scale and then switching to shorter ranges when nearby targets appear, or as the ship approaches the coastline, harbor, or other vessels in the area.

The long range scales (i.e. 3, 6, 12, 24nm) best show the overview of the ship's relationship to landmasses, weather fronts, and large ship targets at or beyond view.

7.1.1 Map orientation

In the RELATIVE mode, the heading line always appears on the screen at 0° relative according to the on-screen bearing scale, and is coincident with the antenna beam passing the ship's bow. Thus the top of the displayed picture represents the direction in which the ship is heading.

All targets appearing on the display are "Relative" to own ship's position and heading. As you look outside at targets around you, you will see that the targets are appearing on the Radar display at the same relative bearing.

The Electronic Bearing Lines (EBL) are available radar tools used to measure bearings to radar targets from own ship. The bearing readouts may be in relative or true modes.

7.1.2 Environmental effects

The effects of **weather** and **water surface** conditions generally act to reduce the ability of radar to detect targets. Weather effects reduce the long range at which targets can be detected. Water surface clutter (waves) reduces the ability to detect targets close by. Either can obscure the echoes from targets that may prove dangerous to your vessel.

You can't see **wind** on your radar screen, however you can see its effects when it produces waves and spray on the water surface. "Sea Return" is most pronounced in the direction from which the wind is blowing. Proper use of your "Sea clutter" (also known as STC) adjustment can reduce the effect of wind and waves, but care must be taken not to increase the control to the point where weak targets will be overlooked.

Rain, hail and snow can return echoes that appear on your radar screen as a blurred or cluttered area. Targets within the area of **precipitation** can be masked by the clutter. The maximum range of the radar pulse is greatly reduced as the energy of the radar beam is scattered and absorbed by the water droplets. Proper use of your Rain Clutter (also known as FTC) adjustment helps you to look into areas of precipitation to detect targets.

Buoys are moored to the bottom with concrete via chain. The chain is longer than the depth of the water to allow the buoys to ride in the current and go up and down with the tide. Unfortunately this allows the buoys to lean in the direction of **the current.** Radar reflectors built into the buoy do not work well when the side of the buoy is pointed to the sky. Therefore if you are going with the current, the images of the channel markers may appear faint. If you are going against the current, the buoys will be leaning in your direction and produce a stronger image on the radar screen.

The iron mass and angles of the metal in the structure of a **bridge** can cause unpredictable interference patterns on your radar. It is not unusual for a reflected image to appear on the radar screen in front of you just as you pass under the bridge. A similar effect is also common on sailboats where the radar antenna is mounted close to an aluminum mast.

Overhead cable crossings can mimic a moving target on your radar screen. The cable target usually appears to be on a collision course. The entire length of cable does not appear on the screen, only a point on the cable, and that point keeps changing giving the illusion of a moving target.

7.1.3 Effects of ship's movement

Radar images can be drawn in two ways on the radar display to show the ship's motion. The type of display modes are called "Relative motion" and "True motion". In Relative motion, the most common radar display mode, own ship is permanently fixed at the center of the display but radar echoes (targets) move in relation to your vessel. With no movement of the ship, a steady display of fixed radar echoes is shown. If the ship is moving ahead on a constant course, echoes appearing at the top of the display will move downward across the display. Your own ship's position will always remain at the center of the display.

If the vessel alters course to the right, the displayed echoes will be displaced by an equal amount in bearing in a counterclockwise direction, and vice versa. These changes in the display pattern with ship movement is an extremely important characteristic to remember

when maneuvering around nearby vessels, or buoys.
The True motion display mode can be compared to your vessel moving on a map or chart. In True motion mode, the surrounding landmass echoes remain stationary on the screen and if your ship is moving at a constant course and speed, you will see your position move across the screen towards the edge of the display. Any other targets which are underway will also be moving on the display screen at their True course and True speed. All motion seen on the True motion display is "TRUE" (meaning motion over the ground).

7.1.4 Navigational echoes

Echoes displayed on the radar screen may be large or small, bright or faint, depending on the size and shape of the object and its angle relative to your radar antenna. The radar indication is not always the same as an observer's visual indication; a nearby small object may appear to be the same size as a distant large object on the radar. With experience, however, different targets can be identified by the relative size, brightness, and position of their radar echo returns.

Buoys and small boats are one example of targets that are sometimes difficult to distinguish from each other. Their movement in the waves do not present a consistent reflecting surface. Consequently, their echoes have a tendency to fade and brighten or sometimes to disappear momentarily. Although buoys and small boats often resemble each other, usually the motion of one target identifies the boat from the buoy.

High coastlines and mountainous coastal regions are often observed at the longest ranges of the radar. However, the first sight of landfill on the radar's longest ranges may be a mountain several miles inland from the coastline and not the actual coastline. The coastline may not appear on the radar until the vessel has approached land nearer the line of sight distance.

7.1.5 Sea return

Not all radar echoes are produced by hard navigation items such as boats, buoys and land. Some radar echoes may be received from irregularities on the surface of the water, particularly at close range by

breaking wavecrests, particularly in windy weather and in heavy seas. These echoes appear on the radar screen on the very short range scales as multiple small echoes next to own ship. Under high winds and extreme conditions the echoes from sea clutter may appear as dense background of clutter forming the shape of an almost solid disc, as far as one to three miles in all directions from own ship. The radar has a control which can be used to minimize the effects of sea clutter pickup on the screen.

7.1.6 Storm and rain squall returns

The radar can also see echoes from rain or snow. Echoes from storm areas and rain squalls consist of countless small echoes, continuously changing in size, intensity, and position. These returns sometimes appear as large hazy areas on the display depending on the intensity of the rainfall or snow in the storm cell. The cells usually may be visible at long distances due to their high altitude above the radar horizon and are very helpful for observing potential bad weather conditions. If the returns from storm areas and rain squalls are not desired, the RAIN clutter control can be adjusted to minimize the effect on the radar screen.

7.1.7 Blind sectors or shadow effect

Funnels and masts, (when located near the antenna array) may cause shadows. Shadow areas can be recognized since beyond the obstruction there will be a reduction of targets and noise intensity, although not necessarily a complete cutoff seen on the screen. However, if the shadow angle is more than a few degrees, there will be a blind sector.

In some shadow sectors the beam intensity may not be sufficient to obtain an echo from a very small object even at close range, despite the fact that a large vessel can be detected at a much greater range. For this reason, the angular width and relative bearing of any shadow sector should be determined at installation. Sometimes shadowing can be seen on the screen by increasing the radar gain until noise is present. Darker sectors indicate possible shadowed areas. This information should be posted near the display unit, and operators must be alert for objects in these blind sectors.

7.1.8 Side lobes

Echoes on the radar screen are not always the direct returns to the radar antenna. There are many types of false echoes that can appear on the display if certain conditions occur. The sections that follow, briefly describe the echo patterns that may be produced by these false echoes and their likely cause. It should be noted that the radar operator, through observation, practice, and experience usually can detect these conditions very quickly.

A very small part of the RF (Radio Frequency) energy from each transmitted pulse is radiated outside the radar's narrow beam, producing side lobe patterns. Side lobes normally have no effect from distant or small surface objects, but the echo from a large object at short range may produce an arc pattern on the radar screen similar to a range ring, or appear as a series of echoes forming a broken arc. Side lobe echoes normally occur at a range below 3 miles and usually can be reduced by adjustment of the SEA clutter control.

7.1.9 Radar interference

Whenever two or more radar equipped vessels are operating within reception range of each other, mutual interference is likely when the radars are operating near the same frequencies. This interference usually appears on the screen as a series of small dots. The interference seems to move from the PPI center (radar screen), sometimes in a straight line, but more often in a long, sweeping curve. This type of interference is more noticeable on longer range scales. This does not, as a rule, impair the effectiveness of the radar as a navigational aid. Since the interference can be completely eliminated by turning IR "ON" in the function menu. The IR feature is normally left "on".

7.1.10 False echoes

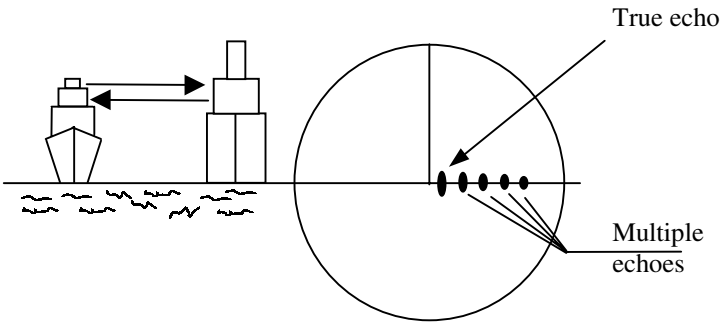
Occasionally, echoes may appear on the screen at positions where there is no actual target. This type of target is called a False Echo. Sometimes they are known as Ghost Images, Indirect Echoes or Multiple Echoes depending on how they are generated.

Ghost images usually have the appearance of true echoes, but, in general, they are intermittent and poorly defined. A true ghost image retains

a fixed relationship with respect to the true image and characteristically produces a more arc-like appearance with a tendency to smear on the screen. Ghost images are sometimes caused by large targets which have a wide, smooth surface as they pass by near your own ship. Ghost images sometimes are referred to as indirect echoes. Indirect echoes may appear when there is a large target, such as a passing ship at a short range, or a reflecting surface, such as a funnel or spotlight on your own ship in line with the antenna. The signal, on first striking the smooth side of the large target, will be reflected, and these subsequent echo returns to the antenna are shown on the display. However, the same reflection may also hit other masts or obstacles and then be picked up by the radar antenna with enough strength to appear as a target on the radar screen at various locations.

Multiple echoes could appear if there is a large target having a wide vertical surface to your own ship at a comparatively short range. The transmitted signal will be reflected back and forth between the wide vertical surface of the target and your own ship.

Thus, multiple echoes will appear beyond the true target's echo on the same bearing as shown below. This is not a very common phenomena.



7.2 Starting operation

The Golden Rule!
Today's radars are packed full of neat features designed to make your cruising more enjoyable and safer. Use these features when you can, but remember the old axiom KISS (keep it simple sailor). If a target shows on the display, there most likely is something there. If there are no targets shown on your display, it doesn't guarantee there are no other objects around. *Maintain a good visual watch, proceed at a safe speed and enjoy your boating.*

7.2.1 Radar menus

Main radar menu:

MENU
6

Call up the menu bar, and…
press [6] *to call up the* RADAR *main menu*

6 RADAR	
1 Radar	- see section 7.2.5
2 Dual radar	- see section 7.2.6
3 Radar setup	- see section 7.2.2

Radar quick menu:

RADAR
ENT

Hotkey to radar display
press [ENT] *to activate the pop-up window:*

Radar quick menu		
5	Lock chart cursor to radar cursor	- see section 7.2.7
6	Lock chart scale to radar range	- see section 7.2.7
7	Show active navigation point	- see section 7.2.7
8	Show cursor EBL	- see section 7.2.8
MENU	Exit	

7.2.2 Initial radar display setup

After the installation has been completed there are a number of parameters to check out and adjust according to the actual circumstances. All defaults from the factory are tested for various situations, however, if your situation is such that adjustments are required, please refer to the details described in this section.

☞ Leave the radar function in **Power off** mode until you have selected the correct Scanner Type and Scanner Rotation.

MENU *Call up the menu bar, and…*
6,3 *load Radar setup display*

Example:

HU	4.0nm
Power off	
TI	
Tune	AUTO
Gain	AUTO
Sea	AUTO
Rain	
Scanner type	RB715A
Scanner rotation	24rpm
Antenna height	05m
Heading adjust	000.0°
Tuning reference	079
Zero range/timing	0109
Sensitivity	048
GZ target threshold	5
Stand-by time	000000h
Tx time	000000h
Auto sea minimum	035
Auto sea default	050
Auto sea maximum	070
Auto gain minimum	080
Auto gain default	090
Auto gain maximum	105

Head-**U**p, **N**orth-**U**p, **T**rue **M**otion.
Range scale is 4.0nm..
Power off, X-MIT, Stand-by.
TI: Tuning indicator.
*Tune, Gain, Sea: Press CLR to toggle between auto and manual operation.
*Rain: Rain Clutter / FTC.
Scanner type: RB714A, RB715A, RB716A.
Scanner rotation: related to scanner type.
Antenna height: 5m above water.
*Heading adjust: in degrees to 0°.
*Tuning reference: adjust if necessary.
*Zero range/timing: adjust if necessary.
*Sensitivity: adjust if necessary.
*GZ Target Threshold: levels of 1 to 7.
Stand-by time: Elapsed standby time.
Tx time: Elapsed transmission time.
*Auto sea and Auto gain are preset for best performance under normal conditions.

*= Only adjustable in X-MIT mode.
More details on next pages.

ADJ *Open for adjustment*
- a warning will pop up that you are about to change settings for the radar, press [MENU] to escape, or [ENT] to proceed.

Use the cursor key to move around in the settings. Toggle between available values with the +/- keys, and insert data by the numerical keys.

ENT *Confirm the adjustments by* [ENT] (or [MENU])

Scanner type: use +/- keys to select the radar antenna model which is installed. See the Installation manual for selection of antenna.
☞ Be careful not to select the wrong type of Scanner, as this may cause a system failure.

Scanner rotation: can be set to either 24 or *48 rpm, depending on the scanner type (use +/- keys).
*Running 48 rpm is liable to reduce the lifetime of the mechanical parts.
☞ Do not change the Scanner rotation while the radar is transmitting. Make sure the radar function is either in "Standby" or "Power off".

Antenna height: enter the actual height above water of the radar antenna/scanner.

Heading adjust: Orientation should be HU (Head Up). Turn the ship, so a target becomes visible in the front and adjust until target is straight ahead on the heading line. Use the +/- keys to position it correctly.

Tuning reference: is preset to 079. Normally there should be no need to adjust the Tuning reference. However, if sensitivity is poor or there are any symptoms at all suggesting improper tuning, you may need to make an adjustment: Choose a displayed range of 3nm or higher. Use cursor to go to the Tuning reference value. Use +/- keys to adjust the value until echoes are clearly visible.

Zero range/timing: Most common settings are between 105 and 115. Default setting is: 109.
To adjust: Press the [9] key to set the displayed range to 0.125nm. Use cursor to highlight "Sea" and with +/- keys set the sea clutter very low, so you can see the transmitting pulse. Now adjust the value for Zero range so the ring around the ship is very small.
If you have knowledge of the distance to a nearby object, say a mast or a buoy, you can verify if the Zero range is set correctly by measuring

the distance. To do so, place the VRM ring on top of the object and check the readout in the control panel (follow procedure in sec. 7.2.5). If the readout is not the same as the known distance, adjust the value in Zero range with 1 figure up/down for every 3 meter adjustment.

Sensitivity is preset to 048. Adjust value if echoes are not reasonable clear i.e. the higher the value, the less detailed presentation of echoes.

GZ target threshold: is preset to 5. Objects are identified according to weak/strong signals. 1= weakest, 7= strongest.

Auto sea and **Auto gain** settings i.e. Minimum, Default, Maximum. If necessary, the factory presets can be adjusted (0 to 255) to improve the clarity of the echoes. After the adjustment, the new values will be the new AUTO settings. Preset parameters can only be adjusted from X-MIT mode *after correct scanner type, etc. has been selected and Stretch mode is left in off position*:

• **Auto gain values**

To adjust the preset values, you first have to:

1. Adjust Rain to minimum acceptable value: move cursor to the 'Rain' bar, and adjust with +/- keys.
2. Adjust Sea to minimum acceptable value: move cursor to the 'Sea' bar, and adjust with +/- keys.
3. Set 'Tune' bar to 'AUTO' mode: move cursor to the 'Tune' bar and press [CLR].
4. Choose a displayed range of 3nm (press key [4]) or higher.

Now you are ready to adjust the Auto Gain values in the last three lines of the Radar setup display:
Auto gain minimum (factory value 080): Adjust to optimum radar image - fairly clear targets and no noise.*
Auto gain default (factory value 090): Adjust to best picture.*
Auto gain maximum (factory value 105): Adjust to maximum allowable level of noise.*
*) wait for screen to update to see the result of adjustment.

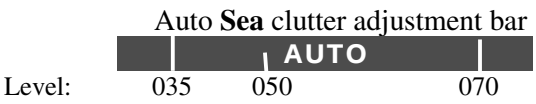
Auto **Gain** adjustment bar

• Auto sea values

To adjust the preset values, you first have to:

1. Adjust Rain to minimum acceptable value: move cursor to the 'Rain' bar, and adjust with +/- keys.
2. Set 'Sea' bar to 'AUTO' mode: move cursor to the 'Sea' bar and press [CLR].
3. Set 'Tune' bar to 'AUTO' mode: move cursor to the 'Tune' bar and press [CLR].
4. Choose a displayed range of 0.5nm (press key [7]).

Now you are ready to adjust the Auto sea values in the lower part of the Radar setup display:
Auto sea minimum (factory value 035): Adjust to visible Sea clutter on screen.*
Auto sea default (factory value 050): Adjust to best picture.*
Auto sea maximum (factory value 070): Adjust to max. allowable suppression of sea clutter.* (If the value is set too high, some targets may be invisible on close range).
*) wait for screen to update to see the result of adjustment.



7.2.3 Start transmission

Normally when starting the transmission, it will take approx. two minutes for the antenna to warm up and be ready for transmission. For initial start-up and after long storage, see below.

Make sure nobody is standing close to the radar antenna when it starts to rotate after the transmission is activated!

RADAR TX
2 sec's

Press [RADAR] *from full-screen window to load Radar display, and press for 2 seconds* [TX] *to start a count-down of 120 seconds to warm up the antenna*

However:
☞ Starting up the first time after installation or after long storage (6 months), the antenna will need an extra 20 minutes to warm up, so when the count-down of 120 seconds are finished, the radar must be left in Standby mode for the extra 20 minutes it takes for the antenna warm up properly. This way you will contribute to the lifetime of the magnetron in the radar antenna.

RADAR TX
2 sec's

Press [TX] *for 2 seconds again,*
- when you are ready to start transmitting.

7.2.4 Shut down procedure for the radar function, or back to 'Standby'

TX
2 sec's

Press [TX] *for 2 seconds to Power off, or press* [TX] *for 2 seconds twice to enter Standby mode*

Power off: Pressing [TX] once will start a count-down from 9 to 0 and the radar function will shut down.
Standby: Before the count-down reaches 0, press [TX] for two seconds again to return to the radar function in standby mode without shutting it off.

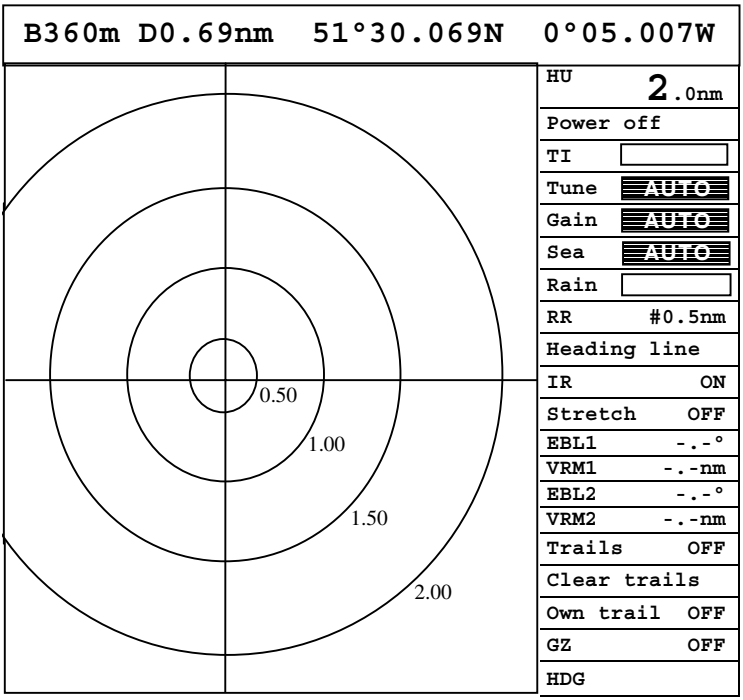
7.2.5 Standard radar display

The radar display can appear in ½ or full screen windows.
The Radar display can only appear in one PAGE at a time.

RADAR *Hotkey to Radar display*
-pressing the RADAR key from any other active ½ or full screen, will load the radar display.

Or load the radar display via the menu:
MENU *Call up the menu bar, and…*
WIN *select the WINdow in which the radar display should appear, and…*

6,1 *load Radar display*
- the top line indicates the bearing and distance from ship's position to cursor position, or ships position with COG and SOG indications.



The control panel will appear as this example in full screen presentation.

In ½ windows, there will only be room for half the size. Toggle between first half and second half of menu by pressing [ADJ].

ADJ *Open for adjustment*

Use cursor to move around in the control panel

ENT *Confirm changes by pressing* [ENT] (*or* [MENU])

There is no regret or "exit without making any change"-key from the control panel. As soon as the keys are pressed to change a function, the actual change is immediately carried out.

Orientation can be either: **HU**, **NU** or **TM**

HU (**H**ead-**U**p in relative motion): The heading line always appears on the display at 0 degrees as the antenna passes the bow of the vessel. Targets appearing on the display are relative to your own ship's position and heading. Most people will operate the radar in Head-up mode, as it allows for the easiest interpretation of the situation around your boat.

NU (**N**orth-**U**p in true motion): In this mode, targets are displayed at their measured distances in true direction from your boat. North being at the top of the display. In the NU mode, you must be interfaced with an electronic compass for proper operation.
Receiving the alarm: "Heading missing" the system will change to Head-Up in relative motion.

TM (**T**rue **M**otion): Targets are displayed at their measured distances in true direction from your boat. Own ship moves past land, buoys and fixed objects. In the TM mode, you must be interfaced with an electronic compass for proper operation.
Receiving the alarm: "Heading missing" the system will change to Head-Up in relative motion.

2.0nm in this example, indicates the displayed range in the radar picture.

Power off use the +/- keys to toggle between: Power off, X-MIT and Standby.

TI is the **T**uning **I**ndicator, which provides an indication of the signal strength.

Tune – see Glossary.
To return to AUTO after manual adjustment, press [CLR].

Gain – see Glossary. Gain can also be adjusted directly from keypad. +/- keys will adjust radar gain. Optimum adjustment: Press [+] till noise appears, then press [-] till noise just disappears again.
Press [CLR] to toggle between manual and auto operation.

Sea – see Glossary + section 7.1.8 and 7.2.2.
Press [CLR] to toggle between manual and auto operation.

Rain – see also Glossary and section 7.2.2.
- adjusting for Rain clutter: Rain clutter or FTC (Fast Time Constant) removes the leading edge of the returning signal. Rain or snow returns cause many small echoes, continually changing in size and position to appear as a hazy area on the display. Rain and snow targets do not have much depth. By removing the leading edge, the unwanted echoes will disappear leaving real targets visible. The amount of delay is controlled by the rain clutter adjustment. As you increase the adjustment, the delay will get larger causing the returning signals to decrease, or disappear. Do not adjust the rain clutter too high, as this will eliminate all small targets.

☞ To properly adjust for rain clutter:
1. Set rain clutter to the OFF position.
2. Set gain.
3. Slowly increase rain clutter until the hazy area caused by the rain or snow become less dense. Increasing it too much will not only remove the rain clutter, but also any targets inside the rain area. Note! Since Rain and Snow are continually changing in size and density, tweaking of the rain clutter adjustment is necessary to maintain the best results.

RR = RangeRings – toggle between # *.** (as display example), *.** (no RR figures), OFF (no RR)

Heading line can disappear for approx. 5 seconds (move cursor to highlight “Heading line”, then press +/-).

IR (Interference Rejection) – toggle between ON and OFF, see sec.7.1.9.

Stretch – toggle between OFF, Auto, Pulse and Video.
Auto: the radar system will choose the optimum solution.
Pulse: will select the nearest longer pulse length on the screen, so the weaker targets far away will be enlarged.
Video: all targets will be enlarged.

EBL (Electronic Bearing Line) **mode:** In this mode a dashed line can be rotated counter-clockwise or clockwise by means of the zoom keys. The bearing from the boat to the target can be displayed in True or Relative degrees. Reset figures with [CLR].

VRM (Variable Range Marker) mode: This is an option that allows to increase or decrease a circular dashed line by means of the zoom keys. The control panel at the side or below the radar display, will indicate the distance in nautical miles that the dashed line is from the boat. By placing the dashed line over a target or over an object, it will indicate the distance to same. The readout automatically adjusts for the range the radar is on. This dashed line can be placed over either a moving target, such as another boat, or a fixed target, such as land. The VRM feature should only be active when needed, and otherwise turned off [CLR] to eliminate extra clutter on the radar screen.

Trails after targets – toggle between OFF, 30sec, 1min, 2min, 5min, 10min, 15min, 30min, PERM (permanent). See also Glossary.

Clear trails will clear all trails, both from targets and own boat.

Own trail – toggle between OFF and ON.

GZ (Guard Zone alarm) –can be set OFF / IN / OUT –see also Glossary. Define your "comfort" zone by means of the EBL and VRM markers. Procedure: Use cursor to go to EBL1 and set the EBL line with +/- keys – this is the first "wall" of the guard zone. Go to EBL2 and set the second "wall". Then go to VRM1 and set the top/bottom "wall" with +/- keys. Go to VRM2 and set the second of the top/bottom "wall".

Then go to GZ and choose:
IN = the alarm will be activated if any target enters the defined guard zone.
OUT = the alarm will be activated if a target leaves the defined guard

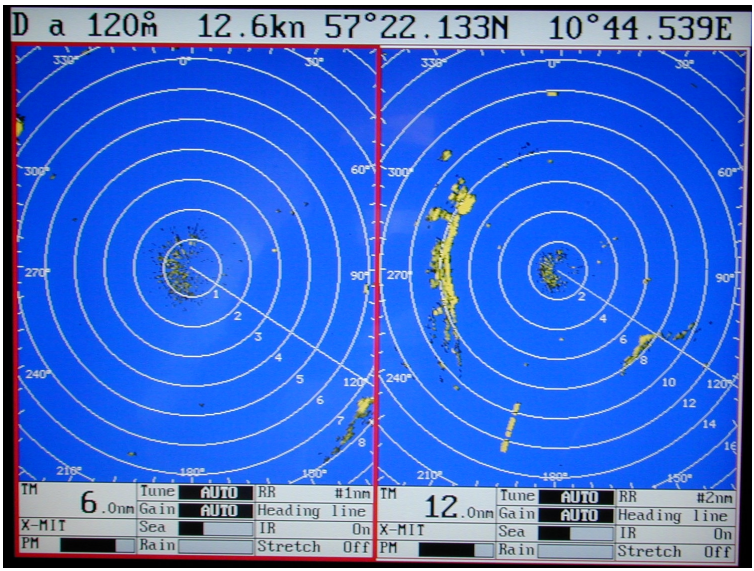
zone i.e. a target must be present inside the GZ when the function is activated.
And lastly, go back to EBL1, EBL2, VRM1 and VRM2, and clear all four settings by pressing the [CLR] key from the value of each. This will give a better view of the defined guard zone.

☞ The guard zone is not available in the secondary radar display in Dual Radar mode.

HDG – your heading will be shown in degrees from connected compass. If no compass is connected, you can receive the heading from the built-in GPS module by setting "Heading" OFF in NMEA INPUT interface setup in [MENU], [7], [2].

7.2.6 Dual radar display

MENU	*Call up the menu bar*
WIN	*Select full-screen image*
6,2	*Load the Dual radar display*



Standard radar display Secondary radar display

This feature requires a full-screen presentation, with the standard display in the left half of the screen and the secondary radar display in the right half of the screen. The two half-screen radar displays can be set up and operated independently. With the dual radar screen activated it is not possible to have a different radar display appearing in a different page. The radar function can only be presented in one page at a time.

To make adjustments in the standard radar display (left half of screen):

ADJ *Open for adjustment*
- by pressing [ADJ] again will toggle between 1st and 2nd half of control panel.

Use the cursor key to move around in the control panel
- and toggle between available values with the +/- keys, and insert data by the numerical keys.

ENT *Confirm changes by pressing* [ENT] *or* [MENU]

To make adjustments in the second radar display (right half of screen):

WIN *Go to the second radar display*

Carry out adjustments by using the same procedures as mentioned above for the standard radar display, except for the guard zone which is not available in the secondary radar display.

7.2.7 Split-screen operation

Improve safe navigation with radar image and chart on the same screen. To split the screen in two halves from any window combination where you want to have a chart in the left half of the screen and the radar display in the right half of the screen:

MENU *Call up the menu bar, and…*

WIN *press the* [WIN] *key until the left half of the screen is highlighted in the screen symbol in the top right corner of the menu bar*

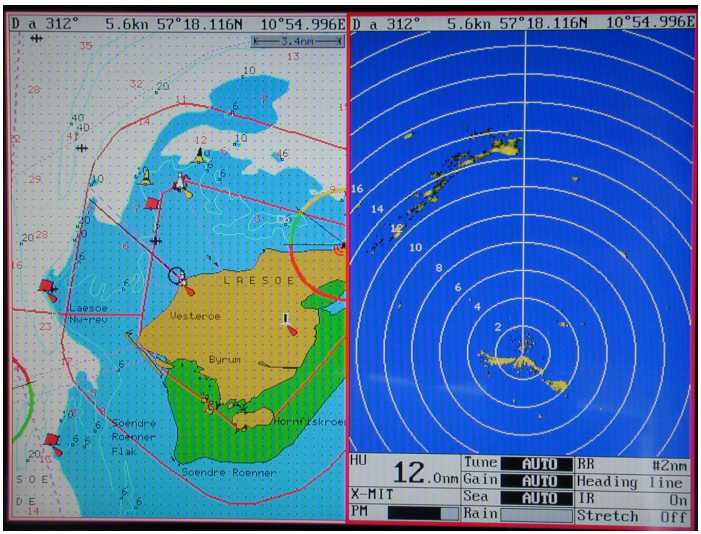
1,1 *Select chart 1 from the chart menu*
- you now have a chart presented in the left half of the screen and are

ready to load the radar display in the right half of the screen:

MENU *Call up the menu bar, and…*

WIN *press the* [WIN] *key until the right half of the screen is highlighted in the screen symbol in the top right corner of the menu bar*

6,1 *Select radar display from the radar menu*
- you now have a chart and radar display presented on the same screen.



As an example you may want to try and match the ship's position on the two charts by setting them both to Head-Up orientation:

ENT From chart display (left window), *press* [ENT], [9] *Chart setup*

● *Go to* Orientation

+/- *Toggle to* HEAD UP *and* RELATIVE *modes*

ENT *Confirm entry*

WIN *Go to the radar display (right window)*

ADJ *Open for change in the control panel*

+/- If orientation is not **HU** (HEAD UP), *use the +/- keys to toggle to* HU

ENT *Exit control panel*

• Synchronize cursors or scale and range
Another method of obtaining a match between radar and chart displays is to lock the chart cursor to the radar cursor, or lock the chart scale to the radar range. The lock function is controlled by the radar display, which means that e.g. moving the cursor in the radar display will move the cursor in the chart display as well. However, when moving the cursor in the chart display, nothing will happen in the radar display, because the synchronization is 'one way only'. Also, when activated, the radar display will then automatically place itself in the left side of the screen - if it's not placed there already.

To activate cursor lock or scale/range lock from radar display with cursor active:

ENT *Press* [ENT] *to activate pop-up display 'Radar quick menu'*

5 *Press* [5] *to lock chart cursor to radar cursor*

6 *Press* [6] *to lock chart scale to radar range*

Synchronizing cursors or scale/range can be applied individually or combined.
☞ To release the lock, repeat procedure or remove one of the displays from the screen.

• Show active navigation point on radar display
Having activated one of the navigation modes from the chart display (refer to sections 6.5.1 to 6.5.4), you can make the approaching waypoint + next waypoint appear on the radar display as well:

WIN *Go to radar display in right half of screen*

ENT *Press* [ENT] *to activate pop-up display 'Radar quick menu'*

7 *Show active navigation point*

This function will stay active for as long as you wish. Turning the navigation mode off, will temporarily set it out of function, because there is nothing to show - but when you start navigating, the function will become active again. You do not have to turn it on and off all the time.
☞Repeat procedure to hide active navigation point on radar display.

7.2.8 General features for the radar operation

• **Alarms:**
The alarms that can appear in connection with the radar operation, are:
- Guard Zone alarm
- Rotation lock alarm (check connection to scanner)
- Heading missing alarm (check connection to compass)
- Communication failure alarm (check connection to scanner)
- Communication time-out failure alarm (no communication between display and scanner)

• **Cursor EBL** (HU or NU modes) - will provide an image on the radar display which will determine the risk of a collision if you continue on the proposed course line. Press [ENT] to activate the pop-up window 'Radar quick menu', and press [8] to show cursor EBL. Now position the radar cursor further ahead in the anticipated course line. A dotted line will be drawn from your own position to the cursor position, and thus reveal if there is a potential risk of colliding with a moving or fixed target.
The bearing and distance from ship's position to cursor position will be displayed in the top line of the screen.

☞ In TM mode the cursor will act as a dynamic cursor (not for anti-collision use).

• **Off-center mode** – permits the operator to obtain a greater view in the direction of interest. Place the cursor within 2/3 of the display and press the [0] key. The ship's position will now be moved to the cursor position and thereby increasing the desired area of view. To deactivate

the Off-center mode, press [CLR] and [0]. This will replace the ship's position back at the center of the display. If the radar system is turned off while the Off-center mode is on, at next power up the offset mode will still be on.

• **PLOT function –** will require that a heading sensor (Gyro or Compass) is connected to the CRXX. If so, then you can plot the actual cursor position on the radar display by pressing the [PLOT] key from the radar display, and thereby save the position in the WP-list as a waypoint i.e. you can give the plotted waypoint a new name/number, symbol, color, etc.

• **Radar colors -** There are two color settings to choose from for the radar display i.e. DAY and NIGHT. See Palette setup ([MENU],[7],[6]). Palette setup 1 to 4 are pre-set from the factory and can not be changed. Palette 5 to 9 can be customized according to your wishes. However, the radar colors are restricted in all palette setups to DAY or NIGHT.

• **Range rings:**
The extension of the range depends on how powerful the connected radar antenna is. There are several ways of adjusting the range on the screen, the quickest way is:

1-9 *Use one of the shortcut keys to quickly go to a different range:*

Press [1] = 24nm [2] = 12 nm [3] = 6 nm
[4] = 3 nm [5] = 1.5 nm [6] = 0.75 nm
[7] = 0.50 nm [8] = 0.25 nm [9] = 0.125 nm

ZOOM *Or you may use the IN/OUT* [ZOOM] *keys to go to a different range* - each press will increase/decrease the range scale with 50 percent.

Or from the active control panel: use the cursor key to highlight the current range scale, then adjust the range scale with approx. 10 percent each time you press the +/- keys.

+/-

Table for range rings and displayed range

Range (nm)	0.125	0.25	0.5	0.75	1.5	3	6	12	24	36	48
Range rings	2	2	2	3	6	6	6	6	6	4	8
Interval	0.0625	0.125	0.25	0.25	0.25	0.5	1	2	4	8	6

Targets:
The **shape** of the target has a direct affect on the image displayed. A flat surface at right angles reflects a good image. Flat surfaces at shallow angles reflect very poor images. A concave surface will concentrate the reflective energy and display an image larger than normal. Convex surfaces will scatter the energy and display week images. A conical surface may not display any image.

The **texture** of the target surface also controls the amount of reflective signal, and therefore the image displayed. A smooth surface is a good reflector, while rough surfaces tend to break up the reflection.
Composition - materials such as metal and water are good reflectors. Others, such as wood and fiberglass are poor reflectors.

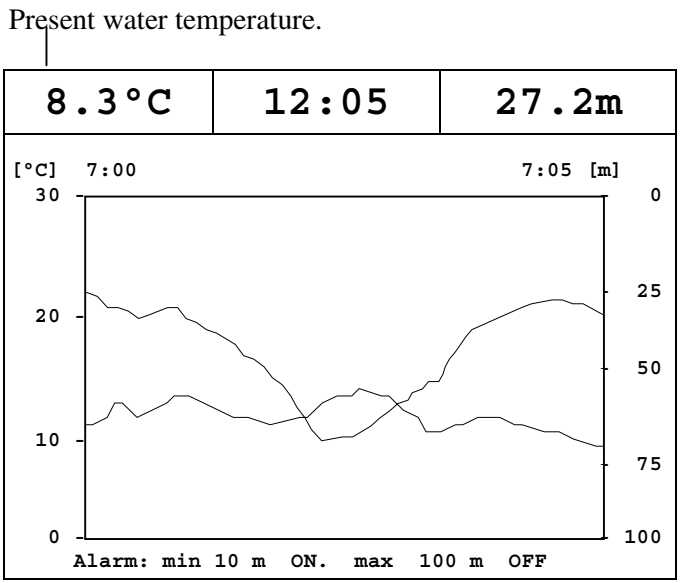
8. Echo menu

5 ECHO
1 Depth & temperature diagram

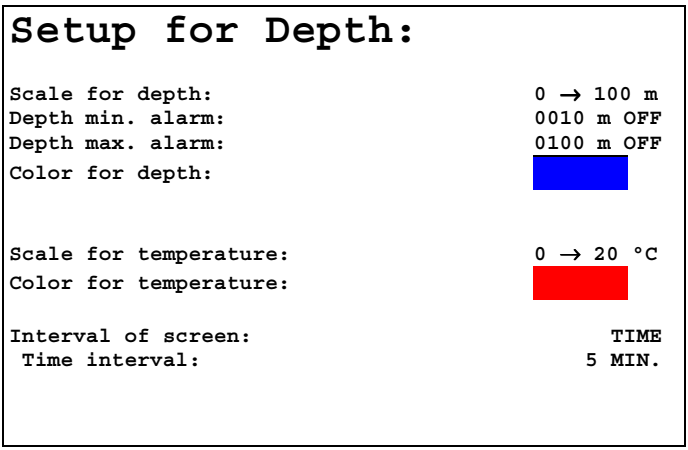
The depth and temperature "instrument" provides a graphical presentation of depth and water temperature from external equipment in relation to time or distance.

8.1 Depth & temperature diagram

MENU *Call up the menu bar, and…*
5,1 *load Depth & temperature diagram*



ENT *Call Setup for depth display*
- see next page.


Setup for Depth:
Scale for depth: 0 → 100 m
Depth min. alarm: 0010 m OFF
Depth max. alarm: 0100 m OFF
Color for depth:
Scale for temperature: 0 → 20 °C
Color for temperature:
Interval of screen: TIME
Time interval: 5 MIN.

Go to the function you wish to change

0-9
+/-

Key in new figure, or…
change setting

ENT

Confirm entry

Scale for depth – there are six depth scales to choose from, ranging from 0-10m to 0-3000m. Toggle with +/- keys.

Alarm – figures for minimum and maximum depths can be inserted, and alarms can be activated/deactivated.

Color – for depth and temperature can be changed. Toggle between available colors by means of the +/- keys.

Scale for temperature – can be set to 0-10°, 0-20°, 0-30°, 10-20° and –10 to 10 °C. The source for temperature is selected in NMEA setup 1 or 2.

Interval of screen – Interval for updating of screen can be related to TIME or DISTANCE.
TIME interval can be set in 6 intervals from 5 minutes to 3 hours (+ freeze) for refreshing of the screen.
DISTANCE can be set in 7 intervals ranging from 0.5 nm to 90 nm in order to adjust to the boat's speed, and you can freeze the reading.

8.2 Special menu

7 SPECIAL	
1 Speed alarm, units & language	- section 8.1
2 NMEA interface	- section 8.2
3 Alarm/log output	- section 8.3
4 Decca lanes	- section 8.4
5 Loran C	- section 8.5
6 Display color	- section 8.6
7 Factory settings	- section 8.7

8.2.1 Speed alarm, units & language

MENU *Call up the menu bar, and…*
7,1 *load Speed alarm, units & language display*

```
Setup for speed:
  LOG speed sensor:                          ON
  LOG speed calibration:        019000 PULSES/nm
  Speed alarm maximum:             000.0kn  OFF
  Speed alarm minimum:             000.0kn  OFF
Setup for units:
  Depth/altitude in:                     METERS
  Distance in:                  NAUTICAL MILES
  Speed in:                              KNOTS
  Temperature in:               DEGREE CELCIUS
Software version:               CR40 MKII 4.01
TL50 version:                    Not connected
PAGE rotation interval:                5 sec.
Display text in:                    English GB
MENU  Exit                          Accept  ENT
```

To select new values for this setup display – see next page.

● *go to the function you wish to change*

0-9 *Key in new values, or…*
+/- *toggle between available values*

ENT *Confirm entry, or…*

MENU *exit function without making any changes*

LOG speed sensor – set to ON, the dual speed display will show water speed from external log sensor (via ECHO1 port).
- set to OFF and NMEA sentence VHW set to ON, the readout will show water speed from external water speed instrument (via NMEA port 1 or 2).

LOG speed calibration – calibrate log speed readout by increasing/ decreasing the number of pulses per nautical mile – see also Appendix A.

Speed alarm – can be set to maximum and/or minimum cruising speed. This may be handy for trawl fishing, entering into harbors with speed limits, etc.
Speed stability and time of response can be adjusted in position setup display, press [MENU], [2], [1], [ENT], and use the cursor key to go to "Speed filter level" to adjust the setting, confirm with [ENT].
☞ Press [CLR] to reset an alarm – this applies to all activated alarms in the system.

Setup for units
- **Depth/altitude in** – can be set to meters (m), feet (ft) or fathoms (fm).
- **Distance in** – can be calculated in nautical miles (nm), kilometers (km) or statute miles (mi).
- **Speed in** – can be shown in knots (kn), kilometers/hour (kh) or miles/hour (mh).
- **Temperature in** – can be shown in Celcius or Fahrenheit.

Software version – indicates which software version is installed in the unit.

TL50 version - indicates if a TL50 Turbo Loader is connected and which version software is implemented.

PAGE rotation interval – can be set to anywhere between 03 to 99 seconds. Refer to "Fundamentals of the WINdow and PAGE system" in section 2.1 for more details on how the function works.

Display text in – as standard the CRXX is supplied with the following display languages to choose from: Danish (DK), English (GB), English (US), French (F), German (D), Italian (I), Nederlands (NL), Spanish (E), Swedish (S), and Portuguese (P).

8.2.2 Interface setup, NMEA

The CRXX has 2 in/out ports:
1. NMEA1 contains both an NMEA port and the connection for the dual station. The NMEA1 data from the main unit is available from NMEA2 port on the dual station.
2. NMEA2 is recommended for standard NMEA interfacing.

The two ports can be set individually to:
- NMEA0183
- EXT. DGPS (External DGPS)
- NMEA0180
- NMEA0182

The next pages indicates the default settings for the interface setups. After the interface setups will follow a description of the input and output sentences available in the setups.

MENU *Call up the menu bar, and…*
7,2 *load Interface setup*

+/- *Toggle between INPUT and OUTPUT*

Go to, and…

+/- *Toggle between individual port settings i.e.* NMEA0183, EXT. DGPS, NMEA0180, NMEA0182.

● *Go to the sentences you want to change*

+/- *Toggle between values, and between ON and OFF*

ENT *Confirm entry, and accept warning* (press [ENT] again), or…

MENU *exit the function without making any changes*

Interface setup: INPUT

Port: NMEA1 – NMEA0183. NMEA2 – NMEA0183

Sentence	String	Status	NMEA
Wind data:			
Relative wind:	MWV	ON	2
True wind:	MWV	ON	2
Water data:			
Water temperature:	MTW	ON	2
Water speed and heading:	VHW	OFF	1
Depth (DPT &):	DBT	ON	2
Heading data:			
Heading:	VHW	ON	2
Position data:			
External position, course, speed:		OFF	
Datum:		000	
Name: World Geodetic System 1984			
Position:	GLL	ON	2
Course:	VTG	ON	2
Speed:	VTG	ON	2
Waypoint data:			
Waypoint location:	WPL	ON	ALL
Target data:			
Target latitude and longitude:	TLL	OFF	1

MENU Exit Accept ENT

Interface setup: OUTPUT

Port:	NMEA1 – NMEA0183.		NMEA2 – NMEA0183
Sentence	String	NMEA1	NMEA2
Position data:			
Global Position System fixdata:	GGA	OFF	OFF
Geographic position, Lat/Lon:	GLL	WGS84	WGS84
Geographic position, Lat/Lon:	GL2	OFF	OFF
Recom. min. specific GPS data:	RMC	ON	ON
Track made good & ground speed:	VTG	ON	ON
Time and date:	ZDA	OFF	OFF
Navigation data:			
Autopilot sentence 'B':	APB	ON	ON
Bearing & distance to waypoint:	BWR	OFF	OFF
Recom. min. navigation info:	RMB	ON	ON
Routes:	RNN	OFF	OFF
Routes:	RTE	OFF	OFF
Cross-track error, measured:	XTE	OFF	OFF
Waypoint location:	WPL	OFF	OFF
UTC & time to destination WP:	ZTG	OFF	OFF

MENU Exit Accept ENT

Description of NMEA0183 version 2.0 output sentences

GLL Geographic position, latitude/longitude.
GL2 Geographic position, with 2 decimals.
GGA Global Positioning System fix data.
APB Autopilot sentence "B".
BWR Bearing and distance to waypoint (Rhumbline).
BWC Bearing and distance to waypoint (Great circle).
RMB Recommended minimum navigation information.
RMC Recommended minimum specific GPS data.
VTG Course over ground and ground speed.
XTE Cross-Track-Error, measured
ZTG UTC & time to destination waypoint.
ZDA Time and date.
WPL Waypoint location.

RTE Routes, ONC ON Complete route, or
ONW ON Working route.
RNN Routes.
VHW Water speed and heading.
☞ Output must be set to NMEA0183 to receive input.
GGA is invalid when operating on external position.

Description of NMEA0183 instrument input
WPL Waypoint data. (will only be updated every 5 seconds)
TLL Target data. (will only be updated every 5 seconds)
MTW Water temperature.
VHW Water speed and heading.
HDT Heading, True
HDG Heading, Deviation and Variation
HDM Heading, Magnetic
VWT True wind speed and angle.
VWR Relative wind speed and angle.
MWV Wind speed and angle.
DBS Depth below surface.
DBK Depth below keel.
DBT Depth below transducer.
DPT Depth, including offset.

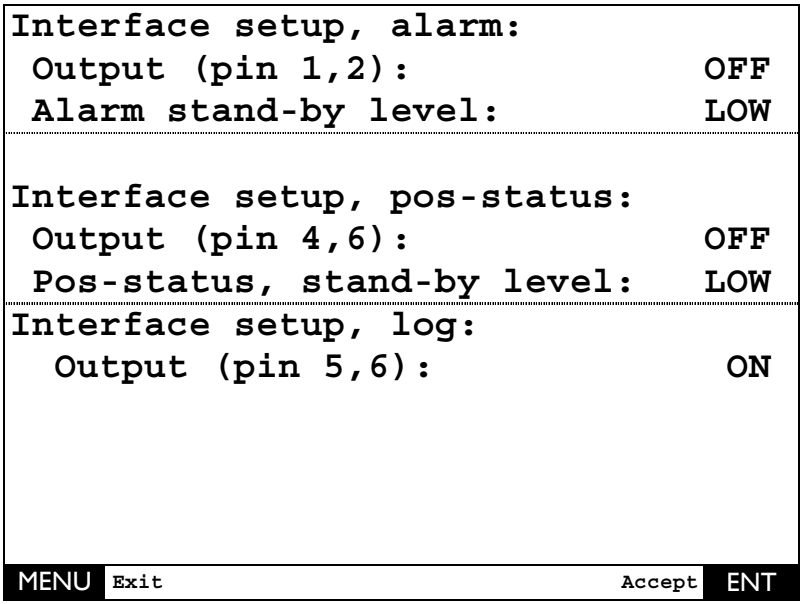
Description of NMEA0183 external position, heading and speed input
GLL Geographic position, latitude/longitude.
RMA Recommended minimum specific Loran C data.
RMC Recommended minimum specific GPS data.
GGA Global Positioning System fix data.
VTG Track made good (course) and ground speed.
☞ Input is only valid when output is set to NMEA0183.

The external position can be set to OFF, ON, or Dead reckoning where you can enter a speed value.

When set to Dead reckoning, the system can function as a Navigation simulator, which can be used for demonstration purpose or for practicing 'live' navigation in 'off season'. See further details in Appendix A under 'Navigation simulator'.

8.2.3 Interface setup, alarm/log

MENU *Call up the menu bar, and…*
7,3 *load Interface setup alarm/log display*



The stand-by level can be either: LOW = 0 volt or HIGH = 5 volt.

● *Use cursor to move around in display, and…*

+/- *toggle between available settings with the +/- keys*

ENT *Confirm entry, or…*

MENU *exit function without making any changes*

8.2.4 Decca lanes

MENU *Call up the menu bar, and…*
7,4 *load decca chain display*

+/- *Leaf through the available chains* – see below.

ENT *Confirm entry*

List of decca chains:

00 S Baltic	0A	24 Skagerak	10B
01 Vestlandet	0E	25 N Persian	5C
02 SW British	1B	26 S Persian	1C
03 North Humber	2A	27 Bombay	7B
04 Holland	2E	28 Calcutta	8B
05 British	3B	29 Bangladesh	6C
06 Lofoten, Norway	3E	30 Hokkaido	9C
07 German	3F	31 Tohoku	6C
08 N Baltic	4B	32 Kyusyu	7C
09 NW Spanish	4C	33 Namaqua	4A
10 Trondelag (N)	4E	34 Cape chain	6A
11 English	5B	35 E Province	8A
12 N Bothnian	5F	36 Dampier	8E
13 S Spanish	6A	37 Port Hedld	4A
14 N Scottish	6C	38 Hokuriku	2C
15 Finland	6E	39 Newfoundld.	2C
16 Danish	7B	40 Cabot strt	6B
17 Irish	7D	41 Nova Scotia	7C
18 Finnmarken	7E	42 Salaya	2F
19 French	8B	43 Kanto	8C
20 S Bothnian	8C	44 SW Africa	9C
21 Hebridean	8E	45 Natal	10C
22 Frisian	9B	46 Shikoku	4C
23 Helgeland	9E		

To change the position readouts to decca mode, see section 4.1 under Position setup, where “Display POS as” can be toggled to “decca”.

8.2.5 Loran C

MENU *Call up the menu bar, and…*
7,5 *load Loran C chain display*

+/- *Leaf through available chain numbers* – see below.

● *If required, go to the slaves, and…*

+/- *Toggle between available slaves* (not all chains have more than one slave)

0-9 *and it is possible to alter the figures in the time delay*

● *If required, go to Offset, and key in a positive or negative offset*

0-9 *Key in a positive or negative offset to the time delay (toggle positive/ negative with +/-)*

ENT *Confirm entry*

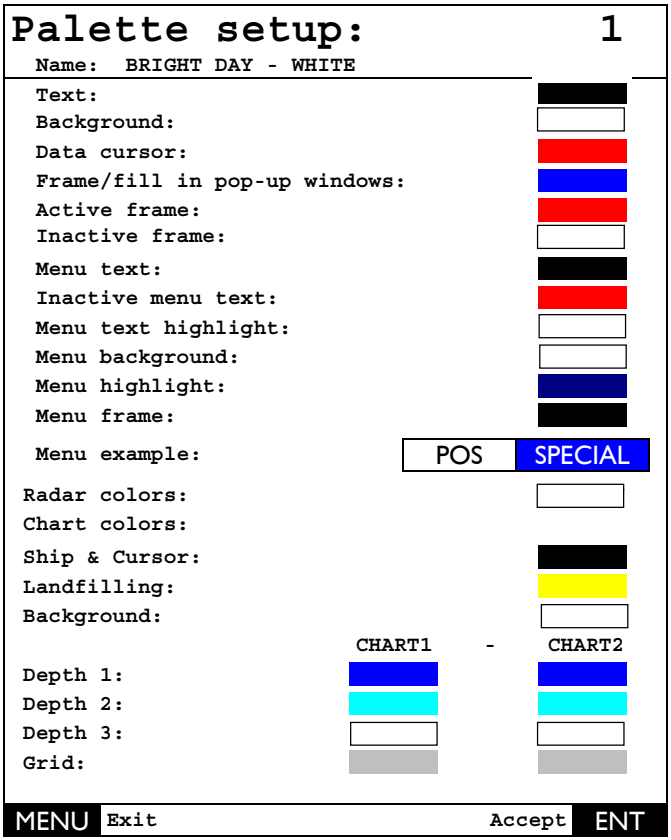
List of Loran C chains:

Central Pacific	4990	Commando Lion	5970
Gulf of Alaska	7960	North West Pacific	9970
Southeast U.S.	7980	Norwegian Sea	7970
Great Lakes	8970	Mediterranean Sea	7990
Northeast U.S.	9960	Icelandic	9980
Canadian West Coast	5990	Saudi Arabia South	7170
Canadian East Coast	5930	Saudi Arabia North	8990
Labrador Sea	7930	Eastern U.S.S.R.	7950
West Coast U.S.	9940	Western U.S.S.R.	8000
North Pacific	9990		

To change the position readouts to Loran C mode, see section 4.1 under Position setup, where “Display POS as” can be toggled to “Loran C”.

8.2.6 Display color

MENU 7,6 *Call up the menu bar, and… load the Palette setup*



There is a total of nine palettes, numbered from 1 to 9.

Palette 1 to 4 are preset to bright daylight (sunshine) in 1 and 2, no. 3 to normal daylight, and no. 4 to nightlight, and they are not adjustable. Palette 5 to 9 can be customized to suit individual needs and wishes. If you wish to make your own special palette setup in e.g. Palette 5, then:

5 *Select Palette 5*

● *Go to, and…*

A-Z *Rename display – max. 31 characters,*
- refer to "Naming of routes, points, etc." in section 2.6.

+/- *Toggle between available color settings*

ENT *Confirm new setup*

8.2.7 Factory settings

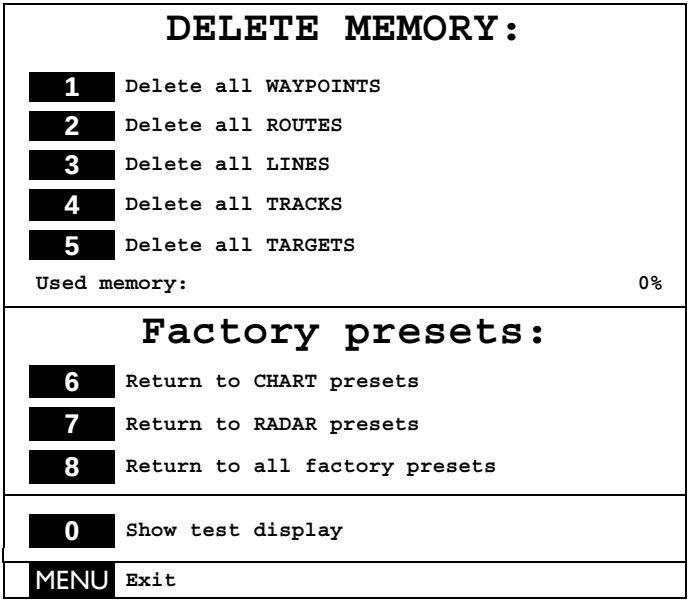
It will be possible to erase a single category of objects entered into the unit by the user – for example, if moving to a different place in the world you may no longer need the routes, etc. you have in the memory. However, an alternative is to store the data on a DataCard - refer to section 5.8.

If the unit is still "alive" but has ceased to respond to normal operation, it could become necessary to return to ALL factory presets – but first check "Troubleshooting" in section 9.12.

☞ Activating the "Return to all factory presets!" will erase all settings including user data i.e. waypoints, routes, tracks, etc., and restore the basic settings from the factory.

Show test display
Information in this display is for technicians only.

MENU *Call up the menu bar, and…*
7,7 *activate Factory settings display*
- see display example next page.



To activate any of the above-mentioned functions, please follow the instructions in the display, or exit without making any changes by pressing [MENU].

Attempting to make any type of change from this display will first of all generate a WARNING display that you are about to erase some or all data/settings.
If you are absolutely sure, press [CLR] to complete the job.
If not absolutely sure, then press [MENU] to exit the function.

Master reset (will return all settings to factory presets)
In case, for some reason, the unit is totally locked i.e. no immediate response from the keypad, the unit can be reset by disconnecting the power supply and then started up again.

If this does not solve the problem, however, then a master reset can be performed by disconnecting the power supply, reconnect the cable and then press [PWR] + [CLR] at the same time, and hold both keys depressed until a picture appears on the screen.

9. Installation notes

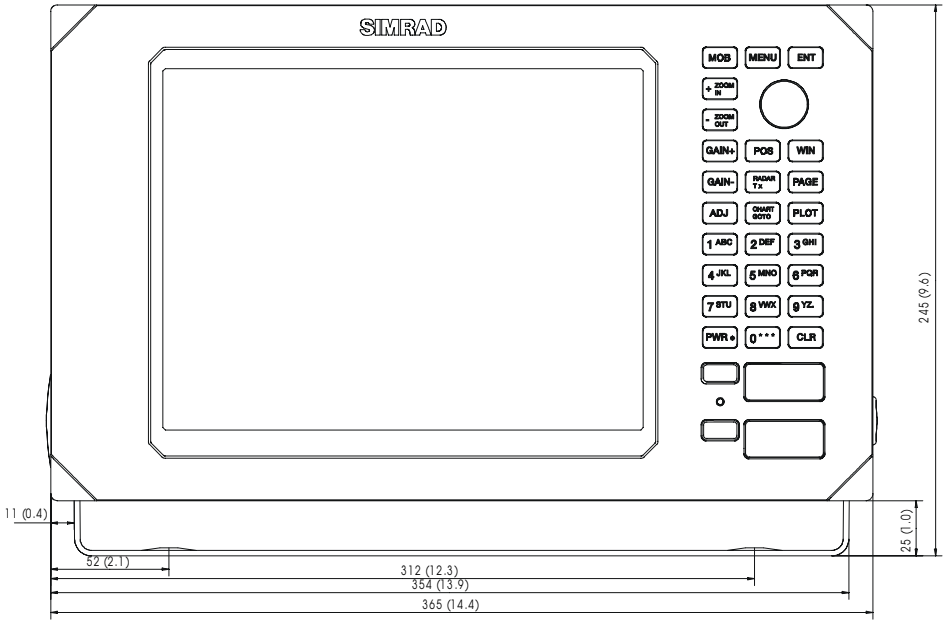
For a number of reasons, all user-related decisions, setups, etc. should be noted in these two pages as they occur. This information may be helpful if your unit has been updated with new software, reset or in for service.

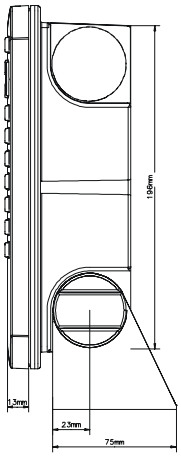
Important settings:		
Radar antenna	**Scanner Type: RB**	**Scanner Rotation: rpm**

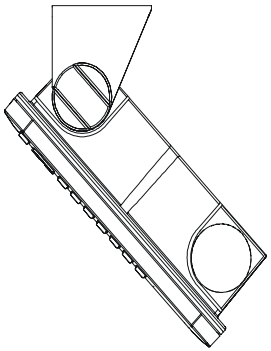
Other important settings (continued):		

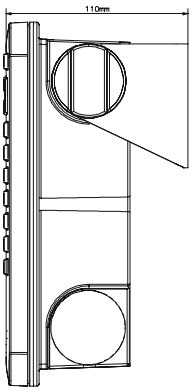
9.1 Installation of CR40/42 Navigation Center

The CR40/42 can be flat or bracket mounted – overhead, bulkhead or console.



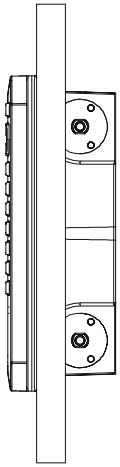






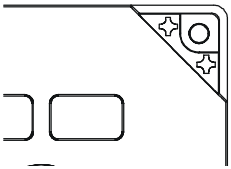
Console Overhead Bulkhead

Flush mounting for CR40/42:

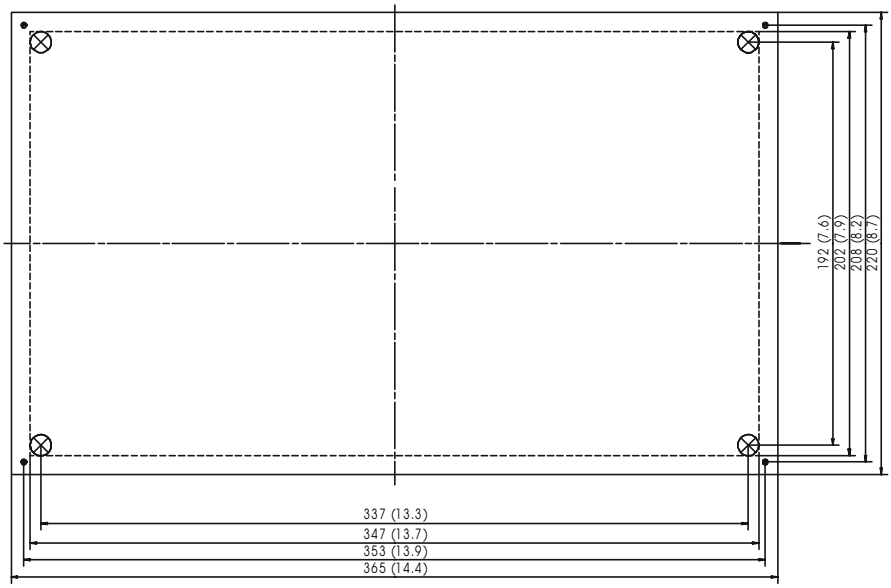


Min. clearance for cables: 15 cm.

Removable corner.

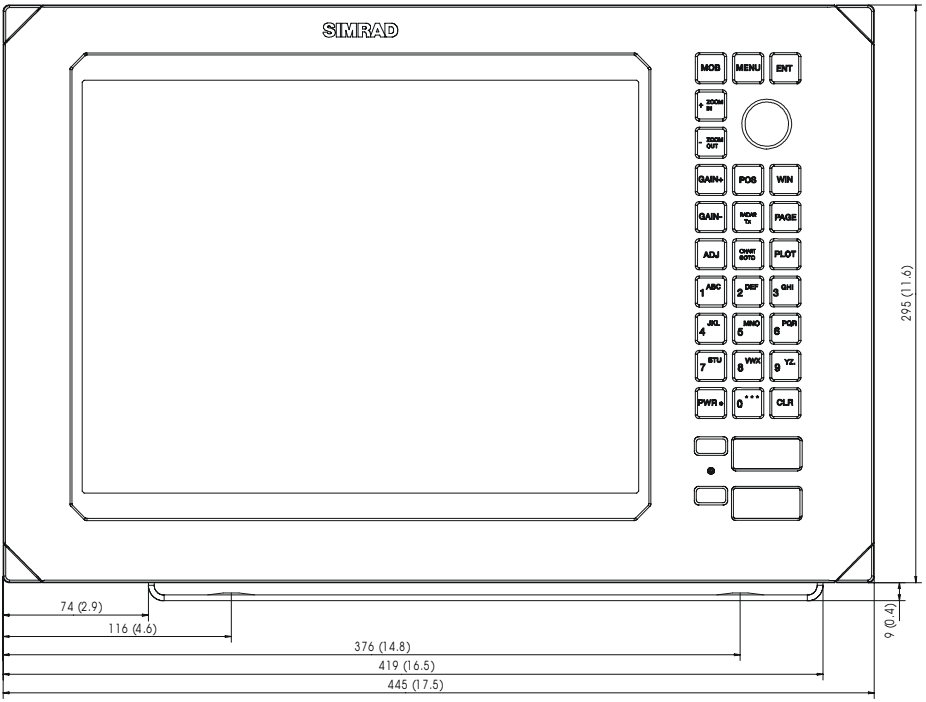


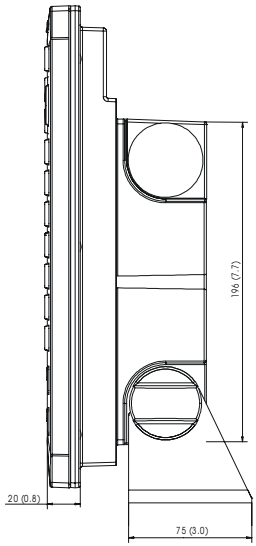
See template for instructions!



9.2 Installation of CR50 Navigation Center

The CR50 can be flat or bracket mounted – overhead*, bulkhead* or console.

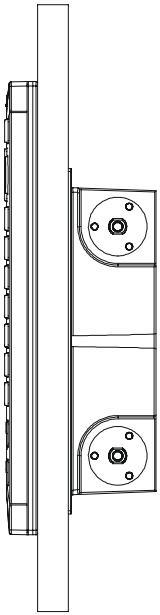




Console mounting

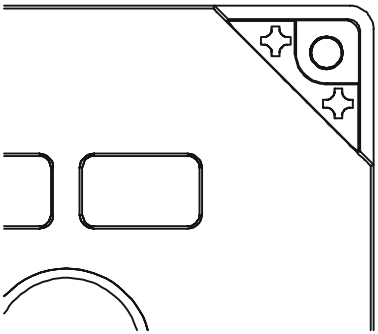
* Overhead and bulkhead mounting is only possible if using a distance piece.

Flush mounting for CR50:

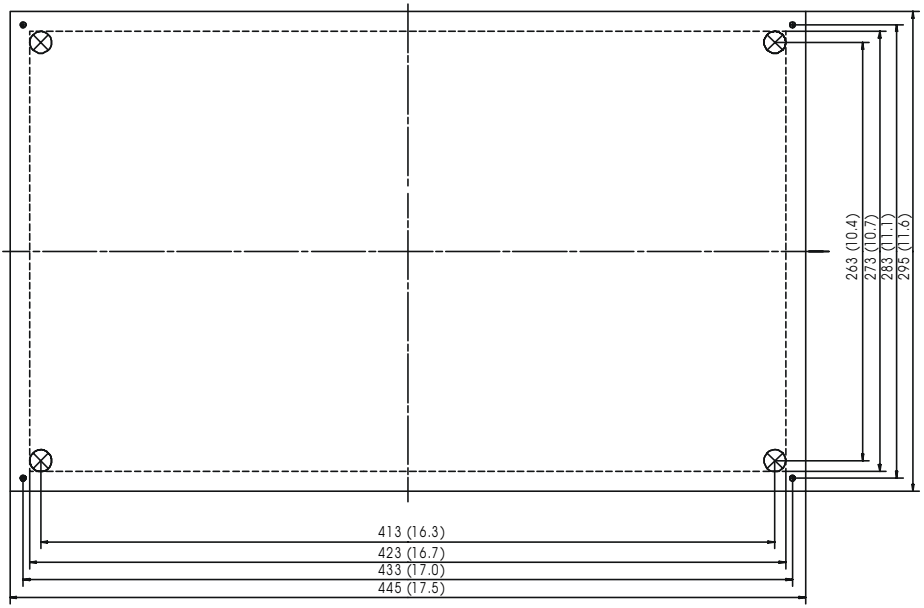


Min. clearance for cables: 18 cm.

Removable corners, example:



See template for instructions:



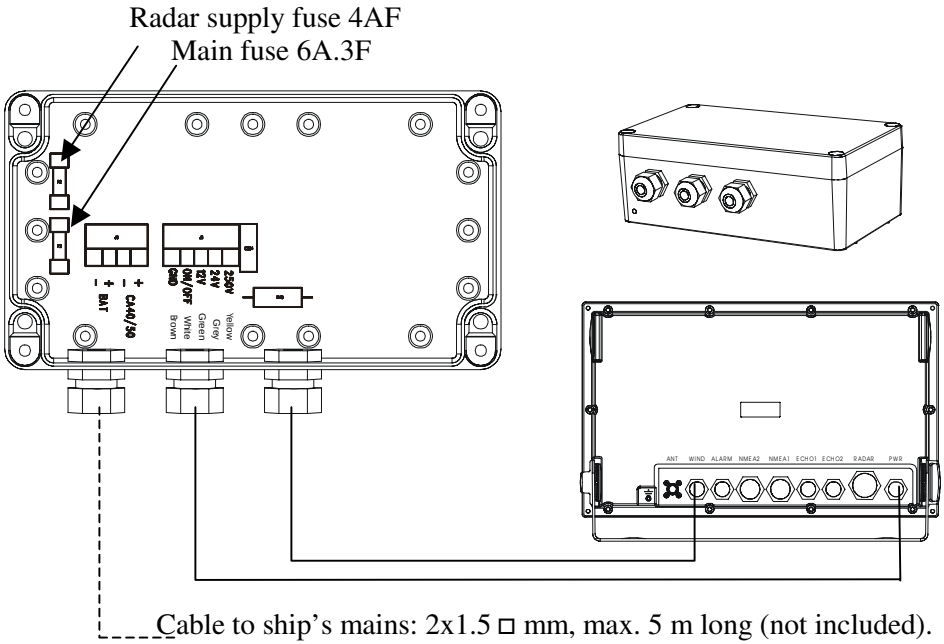
9.3 Place of installation of display unit

The display unit can be installed on desktop, wall surface, or ceiling. Determine the place to install the display unit that is convenient for navigation and radar operation after considering the following suggestions:

- there is a minimum clearance at the back of the unit of 15 cm (CR40/42) or 18 cm (CR50).
- you can see the ship's bow when you raise your eyes from the display.
- there is limited exposure to direct sunlight - see environment temperature limits in section 9.13 Specifications.
- there is good ventilation and minimum vibration.
- there is a minimum distance of 50 cm to a magnetic compass

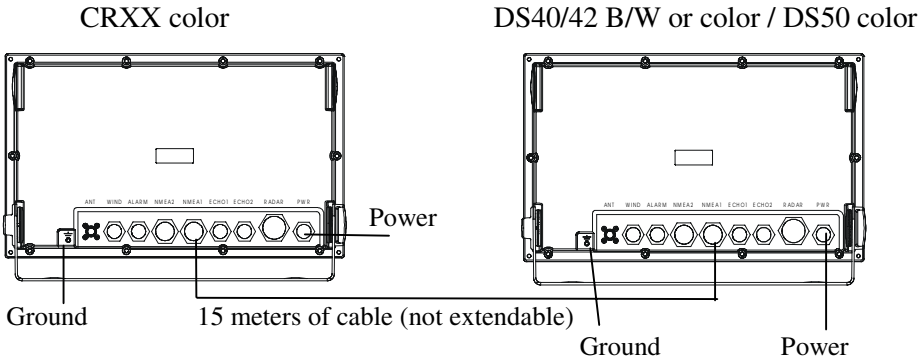
9.4 Installation of Radar supply box RS4050

The external power supply, RS4050, must be connected to the CRXX to run the radar function. Dimensions: H:125mm, L:222mm, D:81mm.
Connect 1.5m cable with 3-pin connector to the receptacle marked 'PWR' at the rear of the display unit, and the second 1.5m cable with 6-pin to the receptacle between 'ANT' and 'ALARM' at the rear of the display unit.



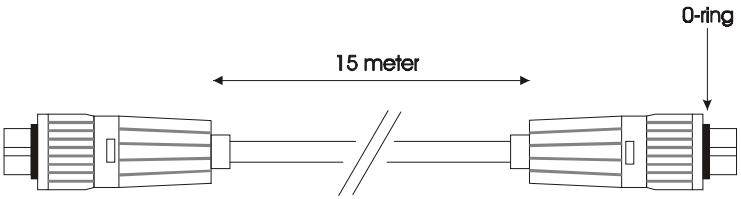
9.5 Installation of Dual Station DS40/42/50

The DS40/42/50 is a remote control unit for the CRXX.
The units DS40/42 and CR40/42 are identical in size, and so are the units DS50 and CR50, so the same installation guides can be used when performing the installation. The dual station unit does not have to match the main unit in size, as all the mentioned units are compatible.



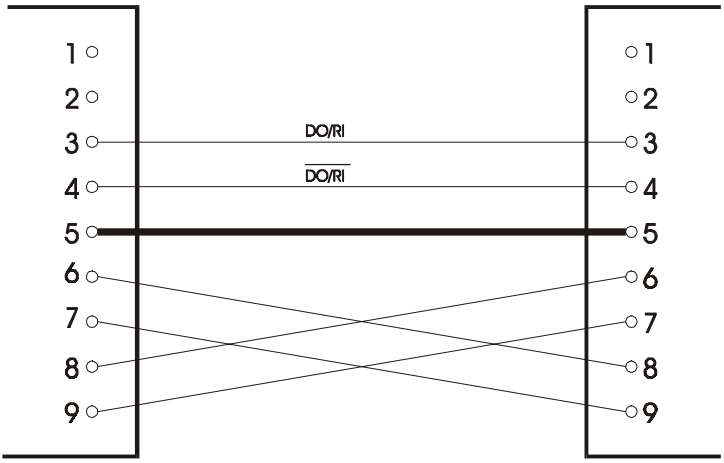
A special connection cable of 15 meters with two male plugs is supplied with the DS40/42/50. Push one of the male plugs into the receptacle marked NMEA1 on the back of the CRXX and the second into the DS40/42/50. The NMEA1 interface from the main unit is transferred to the dual station via the connection cable and is available on the dual station's NMEA2 receptacle.

☞ Refer to section 9.7 for details on pin numbers.



☞ More cable details next page.

The connection cable between the dual station and the main unit is a special pair-twisted cable of 15 meters (not extendable), which consists of the following wires:



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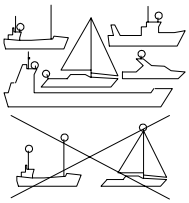
9.5.1 Operation of DS40/42/50 Dual Station

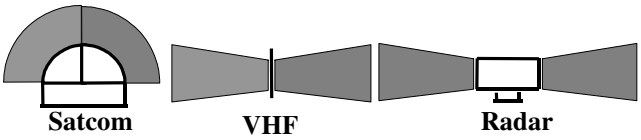
The main unit and the dual station operate in parallel.
All key commands are relayed to the main unit – CRXX – and the display picture is instantly transferred back via a high speed data link.

Adjust light/contrast in screen and background light in keypad via the [PWR] key.
Eject keys and cartridge drawers are blinded, and can not be opened on dual staation.

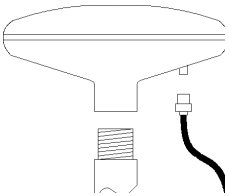
9.6 Installation of the GPS / DGPS antenna



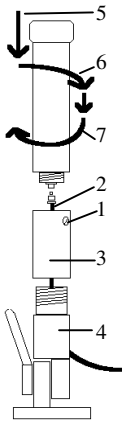
The antenna must be placed in a position where tall constructions, steel wires, masts, etc. do not obstruct the view to the satellites. Do not, however, mount the antenna in the top of a mast or tower, as this may degrade the COG and SOG readings, especially if DGPS is used. Do not place the antenna close to sources of electrical interference, such as radar, satcom, etc. If installing the GPS antenna close to other antennas it must be placed either above or below the radiation beams. There is full coverage down to 20° below the horizon.



Beam area – avoid installing the GPS antenna inside the beam areas.



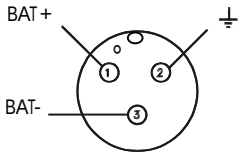
Mounting of DGPS antenna MGL-3
Mount the antenna on a standard US 1" 14 thread pipe, or optional standard antenna mount. Tighten firmly, but only by hand – no use of tools. Attach the antenna cable to the TNC socket.

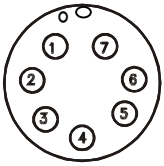


Mounting of GPS antenna RS5640
Loosen the screw (1) of the antenna adapter. Guide the antenna cable (2) through the adapter and connect it to the antenna. Screw the US 1" 14 mount adapter (3) firmly onto the optional antenna mount (4). Press (5) the antenna into the adapter and turn it (6) approx. ½ to 1 turn counter clockwise to "catch" the thread. Turn (7) clockwise 1 to 2 turns and firmly secure the antenna with the lock screw (1).
☞ *Do not close the small ventilation hole at the bottom, and do not attempt to open the antenna.*

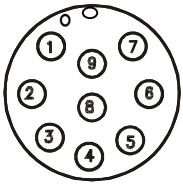
9.7 Electrical connections (connectors, seen from solder side)

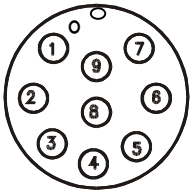
PWR (male mini-con-x)	ECHO2 (male mini-con-x)	ECHO1 (male mini-con-x)
1: + 10-32 Vdc, red (brown) 3: - Battery, black (blue) 2: Earth	- SEALED - No connection available in this model!	1: Speed log 2: 5V supply speed log 3: NC 4: Shield 5: NC 6: Shield 7: Temp.

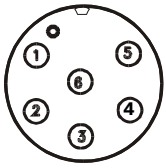




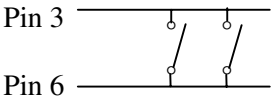
NMEA2 (male multi-con-x)	NMEA1 (female multi-con-x)	ALARM (male mini-con-x)
1: RTS (TL50) 2: DTR (TL50) 3: RXD (TL50) 4: TXD (TL50) 5: GND 6: NMEA2 TX A (DATA OUT) 7: NMEA2 TX B (RETURN) 8: NMEA2 RX A (DATA IN) 9: NMEA2 RX B (RETURN)	1: + 10-32 V out (Dual Station) 2: - Battery out (Dual Station) 3: DO / RI (Dual Station) 4: DO / RI (Dual Station) 5: GND 6: NMEA1 TX A (DATA OUT) 7: NMEA1 TX B (RETURN) 8: NMEA1 RX A (DATA IN) 9: NMEA1 RX B (RETURN)	1: RELAY A, white 2: RELAY B, brown 3: MOB, yellow 4: POS STATUS, green 5: LOG OUT, grey 6: GND, pink



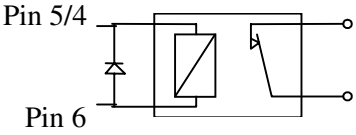




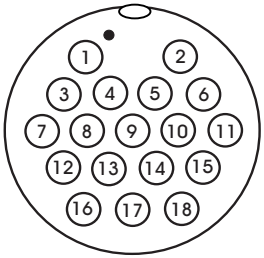
External MOB switches:



External log/pos-status relay

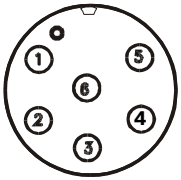


RADAR
1: +250V, Violet
2: +24V, Blue
3: +12V, Orange thick
4: GND, Yellow
5: DATA RETURN, Red shield
6: DATA, Red center
7: N.C.
8: BP/SHF, Brown center
9: BP/SHF RETURN, Brown shield
10:V/TRG, Coax center
11:N.C.
12:BAT+, Red thick
13:N.C.
14:V/TRG RETURN, Coax shield
15:BAT-, Green thick
16:BAT+, Yellow thick
17:N.C.
18:BAT-, Blue thick



☞ Radar connection cables to scanners – see section 9.9.3. Pin numbers and wire colors, see section 9.9.4.

Receptacle next to antenna connection 'ANT'
1:12V/5mA, White
2:GND, Brown
3:NC
4:12V/1.2A, Green
5:250V/40mA, Yellow
6:24V/20mA, Grey



9.7.1 Power supply connections - (refer to section 9.4)
The internal voltage regulator will allow the CRXX to operate normally over the power supply voltage range from 10 to 32 Vdc. Connection between the CRXX and the external power supply is accomplished by means of the supplied power cable, which is approximately 1.5 meters long, and are not extendable.
After connecting the cable to the power source, push the plug as far as it will go into the three pin receptacle marked "PWR" on the rear of the cabinet and turn the plug's coupling ring clockwise until it makes a click.

9.7.2 Fuse

Warning! A fuse should always be installed to protect the unit.
Using a fuse which is not specified for your equipment can cause it to blow the instant the CRXX is switched on or it will not protect the equipment as intended – see fuse rating in section 9.4.

9.7.3 NMEA0183 interface connections

NMEA0183 interface connections are made to the receptacle marked "NMEA1" or "NMEA2" on the rear of the cabinet – turn the plug's coupling ring clockwise until it stops.
☞ *The CRXX must be turned off while connecting/disconnecting the interface cable.*

9.8 Optional connections

General e.g. Autopilot or performance instruments
CRXX NMEA
Pin 6 White TX A (DATA OUT
Pin 7 Brown TX B (RETURN)
Pin 8 Yellow RX A (DATA IN)
Pin 9 Green RX B (RETURN)

EQ40/50 Echosounder

CRXX NMEA			EQ40/42/50 NMEA		
Pin 6	White	TX A (DATA OUT)	Pin 8	Yellow	RX A (DATA IN)
Pin 7	Brown	TX B (RETURN)	Pin 9	Green	RX B (RETURN)
Pin 8	Yellow	RX A (DATA IN)	Pin 6	White	TX A (DATA OUT)
Pin 9	Green	RX B (RETURN)	Pin 7	Brown	TX B (RETURN)

RS2800 Color Trackplotter

CRXX NMEA			RS2800 Port 1 to 4
Pin 6	White	TX A (DATA OUT)	Pin 5
Pin 7	Brown	TX B (RETURN)	Pin 9

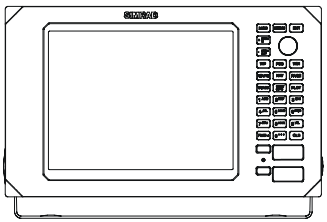
Differential Beacon Receiver (Set Interface to EXT. DGPS)
CRXX NMEA
Pin 8 Yellow RX A (DATA IN)
Pin 9 Green RX B (RETURN)

Compass
CRXX NMEA
Pin 8 Yellow RX A (DATA IN)
Pin 9 Green RX B (RETURN)

IS11 (Dataline) Data Box

CRXX NMEA			Data Box (Dataline)	
Pin 6	White	TX A (DATA OUT)	+ Radio nav input	
Pin 7	Brown	TX B (RETURN)	-	
Pin 8	Yellow	RX A (DATA IN)	WHT	NMEA bus to
Pin 9	Green	RX B (RETURN)	GRN	repeaters

Overview of optional connections:



- Compass
- Dual station DS40/42/50
- Performance instruments
- Color Trackplotter RS2800
- Differential Beacon Receiver
- Water speed and temperature sensor
- Autopilot
- Yeoman digitizer
- Other equipment via NMEA 0183, 0182, 0180
- NMEA Buffer RS5345

9.9 Installation of scanner unit

A radar's target detection capacity varies greatly depending on the fitted position of the scanner. An ideal fitting position is a location high above the ship's keel line where there is no obstacle all around the scanner. In an actual ship, such an ideal location is limited by various factors. Therefore, consider the following suggestions when you determine the place to install the scanner:

A. **Install scanner at a position as high as possible**
The higher the installation position, the longer the radio ranging distance. Install the scanner at a position as high as possible after considering the ship's hull structure and radar maintainability.

B. **Install scanner away from smoke-stack and mast**
If the scanner is installed at the same height as the smoke-stack or mast, radar waves may be blocked, crating shadow zones or generating false echoes. Therefore, do not install the scanner at such a position.

C. **Install scanner forward away from obstacle**
To avoid creating shadow zones or generating false echoes, install the scanner at a position nearer to the ship's bow away from obstacles. When installing the scanner on a mast, position it in front of the mast. (If obstacles cannot be avoided for the ship's structural reasons, refer to "Shifting away from obstacles" described in section 9.9.1.

D. **Do not install the scanner near hot or heat-generating items**
Do not install the scanner at a position where it may be subjected to smoke or hot air from smoke-stacks or heat from lamps.

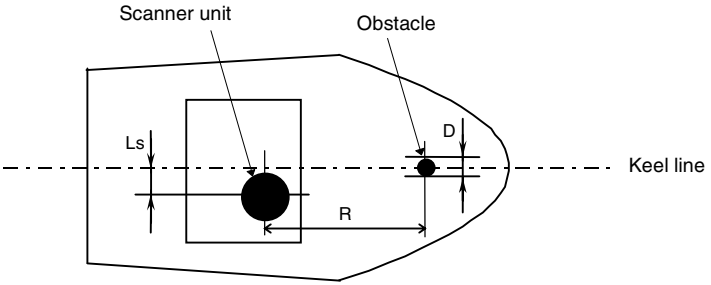
E. **Install the scanner away from antennas or other equipment**
Install the scanner as far away as possible from the antennas of a direction finder, radio transceiver, etc..

F. **Make the cable length as short as possible**
Keep the distance from the scanner to the display within the standard cable length of 10 meters. If using a longer cable for unavoidable reasons, limit the cable length to a maximum of 100 meters.

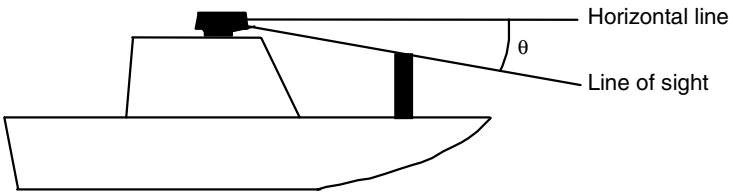
9.9.1 Shifting away from obstacles

Shifting from keel line: By shifting the scanner position from the keel line to the starboard side of the ship, it is possible to move shadow zones to the port side which makes it possible to keep a clear vision in the bow direction. The distance to be shifted can be obtained by calculation depending on the distance from the scanner to obstacles using the following equation:

Ls=0.4R+D/2 [m] (when R<15m)
Ls=0.025R+D/2 [m] (when R>15m)
where Ls= distance to be shifted from keel line
D= diameter of obstacle on keel line
R= distance from scanner to obstacle



Obtaining sufficient dip angle: Raise the scanner position so that there is a sufficient dip angle available between the line of sight from the scanner to the obstacle and the horizontal line. By raising the dip angle above 5° it is possible to prevent mid and long distance shadow zones. The radar cannot detect objects below the line of sight.

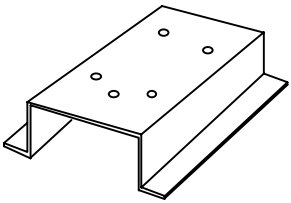


9.9.2 Mounting of scanner

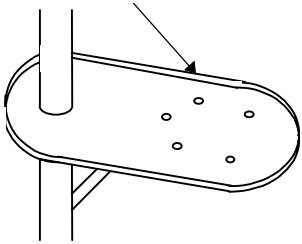
Deciding the place of installation, a minimum distance must be considered to the master compass (2 meters) and steering compass (1.4 meters). If a mount base like the one shown below is available, it may be easier to install the scanner. If not available, you may install the scanner directly to the roof, etc. In this case, pay attention to the water drain tube located at the bottom of the scanner unit during installation.

☞ When the radar mast or mounting bracket has a curvature of more than 2mm, repair it or use spacers.

Mount base.



Do not use an edge that might trap water.

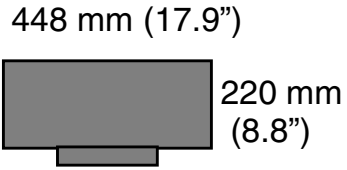


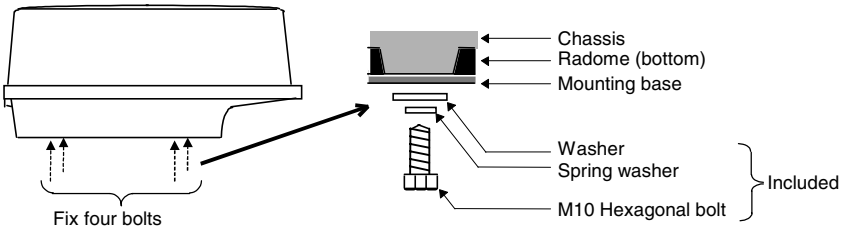
Which size bolts to use for mounting of scanner unit:

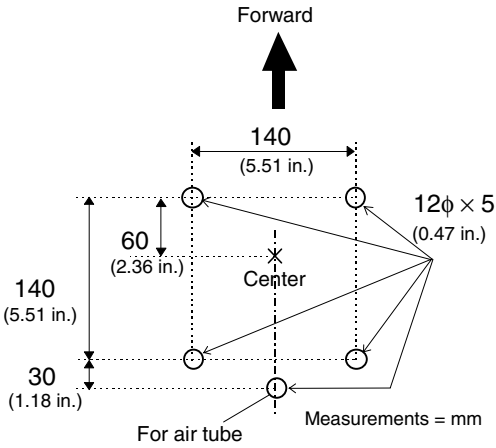
Thickness of mount base	*Bolt requirement*	*Material*	*Remarks*
1-4mm(0.04-0.16 in.)	M10 × 15 (1.5mm pitch)	Steel	
4-9mm(0.16-0.35 in.)	M10 × 20 (1.5mm pitch)	Steel	
9-14mm(0.35-0.55 in.)	M10 × 25 (1.5mm pitch)	Steel	Included with radar
14-19mm(0.55-0.75 in.)	M10 × 30 (1.5mm pitch)	Steel	

RB714 Radome scanner

- 45cm radome
- 2kW
- Range up to 24nm
- Rotation speed 24rpm
- Beamwidth: Horizontal 5.9°
  Vertical 25°







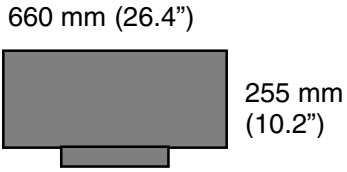
Drilling template for RB714A.

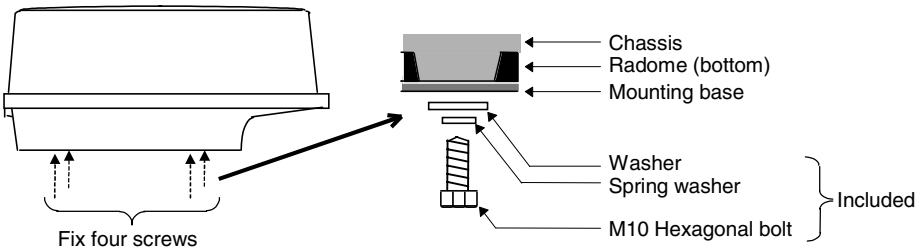
The bolts included with your radar equipment will suffice for mount base thickness of 9 to 14mm (0.35 to 0.55 in.). If the mount base is thicker or thinner than this, prepare bolts as listed on the previous page.

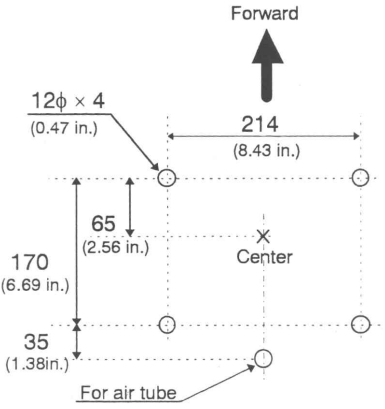
Silicone should be applied to secure the bolts. Do not use locking putty, as it may damage the radome.

RB715A Radome scanner

- 65cm radome
- 4kW
- Range up to 36nm
- Rotation speed 24 or 48rpm
- Beamwidth: Horizontal 3.9°
  Vertical 25°







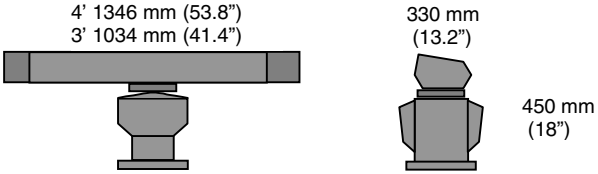
Drilling template for RB715A.

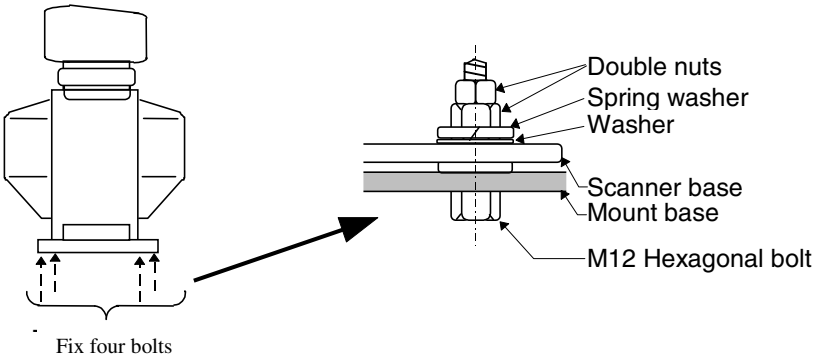
The bolts included with your radar equipment will suffice for mount base thickness of 9 to 14mm (0.35 to 0.55 in.). If the mount base is thicker or thinner than this, prepare bolts as listed on the previous page.

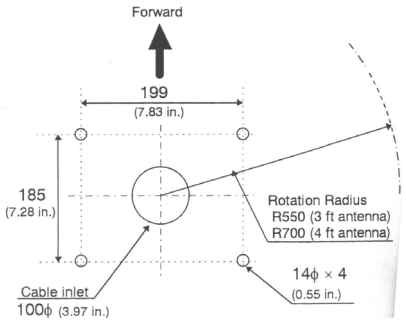
Silicone should be applied to secure the bolts. Do not use locking putty, as it may damage the radome.

RB716A Open scanner

- 3 or 4ft Open array
- 4kW
- Range up to 48nm
- Rotation speed 24 or 48 (24V) rpm
- Beamwidth: Horizontal 2.5°, 1.8° Vertical 22°



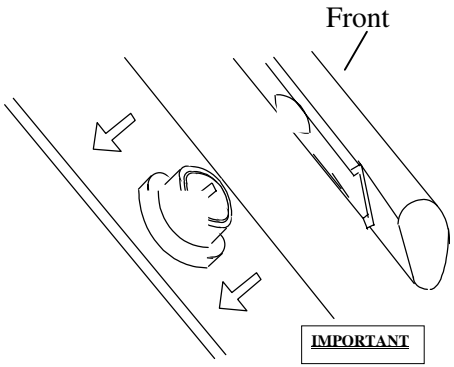




The bolts included with your radar equipment will suffice for mount base thickness of 9 to 14mm (0.35 to 0.55 in.). If the mount base is thicker or thinner than this, prepare bolts as listed on the previous page.

Silicone should be applied to secure the bolts. Do not use locking putty, as it may damage the radome.

Drilling template for RB716A.



Remove the protective cap covering the rotary coupler on the top of the scanner. Match the antenna radiation direction to direction of the arrow on the rotation base and fix the antenna in position using the four M8 accessory bolts.

9.9.3 Connecting cables (length of cables – see 9.12 Specifications)
Run the cables by following the instructions below:

- Do not bind the cable for the radar collectively with cables of other equipment (especially the power supply cable).
- The cable has a connector fitted on the display and scanner side.
  If it is necessary to pass the cable through a narrow path, then fix the scanner side connector vertically by using vinyl tape before guiding the cable through the path.
- Run the cable along the ship's hull or wall surface, and fasten it at intervals of about 40 cm.

Interconnecting cable (RB714A + RB715A)
Ensure that the radar is off. Connect the cable to the receptacle marked RADAR on the rear panel of the display unit.

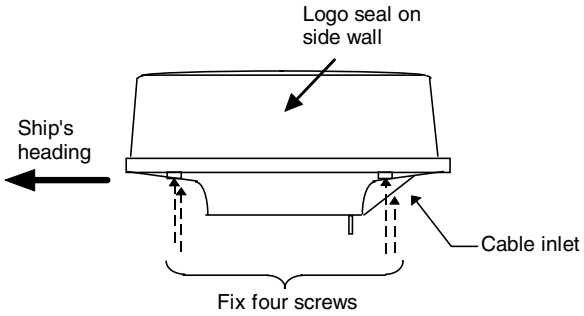
Next, remove the upper part of the radome from the scanner unit. Avoid bumping it against the antenna by lifting vertically (there are four fixing screws). Remove the tape securing the antenna. Remove the shield cover located on the astern side (four fixing screws). Remove the cable clamping plate and rubber ring, pass the

cable through the cable inlet, place the rubber ring around the cable, and clamp the cable to the scanner unit with screws via the fixing plate.
See 'Fitting interconnecting cable' for RB714A and RB715A further on in this section.

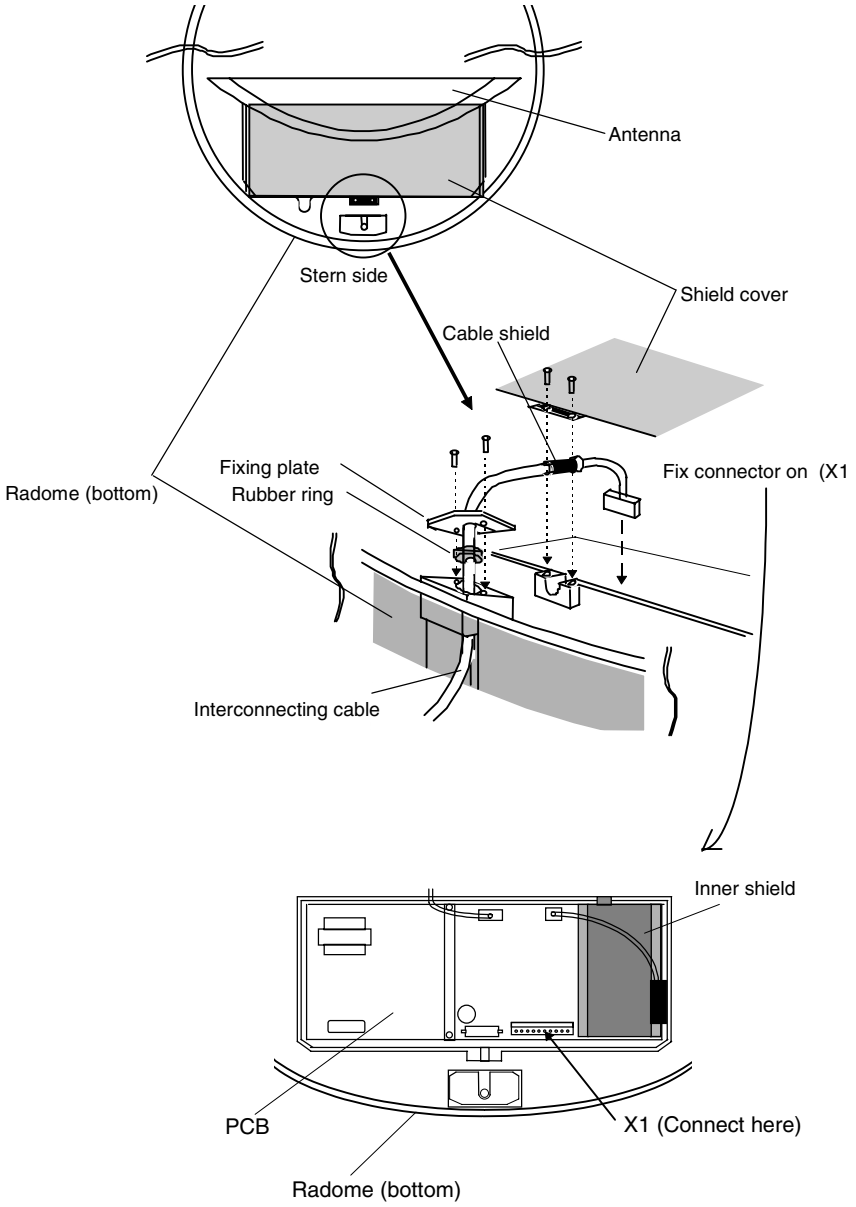
RB714A: Connect 10-pin connector to X1.
RB715A: Connect 7-pin connector to X11 and 9-pin connector to X12 of PCB.

Replace the aluminum cover: Attach a cable shield onto a ditch with the aluminum cover. Be careful that the cable does not get caught between main unit and cover, and that the antenna is free to rotate.

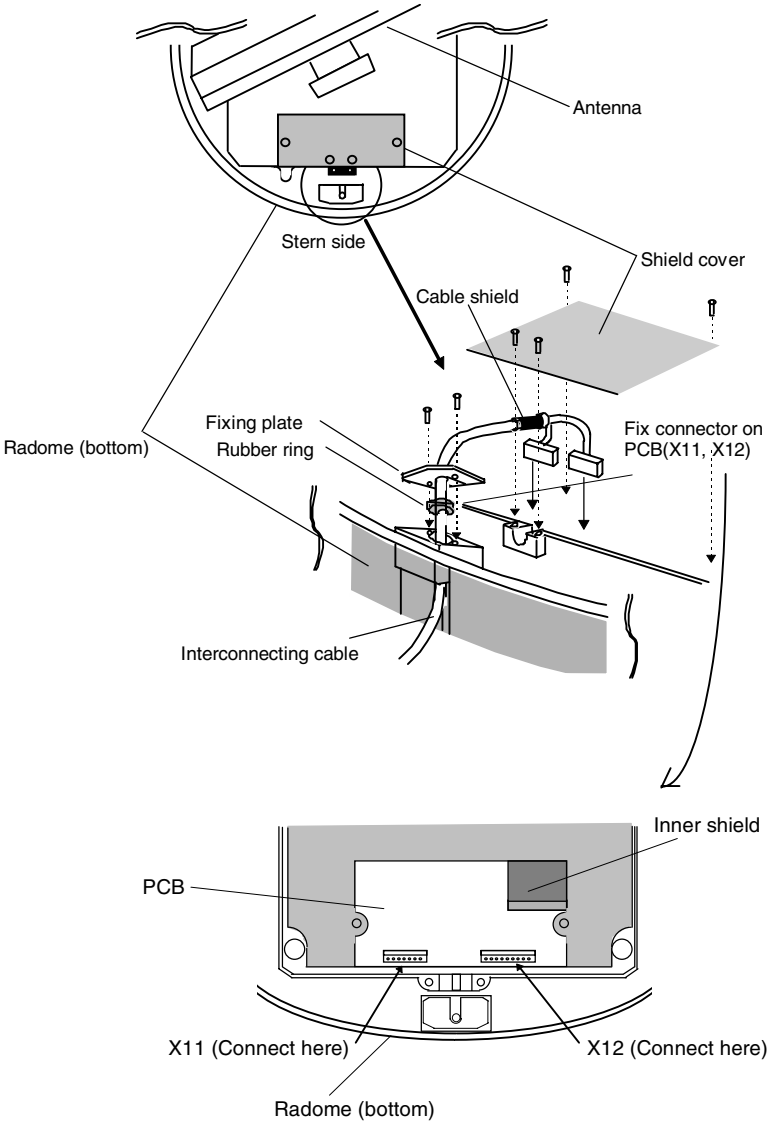
Replace the upper part of the radome: Be careful not to bump it against the antenna. Be sure that the cover is fitted in the correct direction (refer to below illustration). Align the upper and lower parts with the holes for the screws.



Fitting interconnecting cable (RB714A):



Fitting interconnecting cable (RB715A):

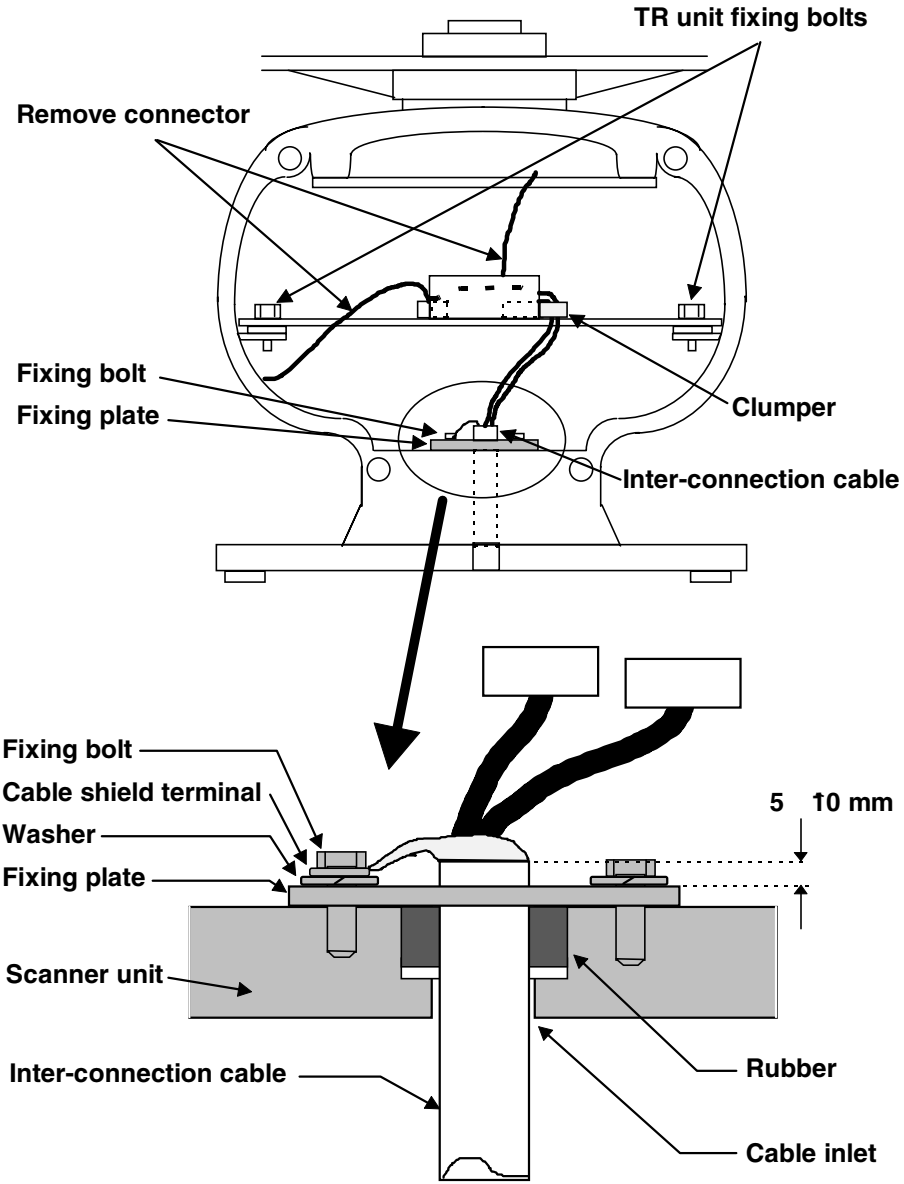


Interconnecting cable (RB716A)

1. Ensure that the radar is off.
2. Connect the cable to the receptacle marked RADAR on the rear panel of the display unit.
3. Use a T-wrench to remove the back covers of the scanner unit.
4. Remove the two bolts securing the transceiver and pull out the transceiver after removing two connectors (to Motor (X1), to Heading switch (X2)).
5. Remove the four bolts securing the fixing plate at the cable entrance.
6. Remove the metal fixing plate, rubber seal and washer that secures the cable.
7. Pass the cable through as shown in the diagram below.
8. Replace the above items and tighten the bolts.
9. Return the transceiver to its original position and secure it with the removed bolts.
10. Connect 7-pin connector to X11 and 9-pin connector to X12 of PCB.
11. Re-connect the two connectors removed at point 4.
12. Refit the scanner covers.
13. Take care the cable is not pinched when refitting the cover.

☞ See ‘Fitting interconnection cable’ on next page.

Fitting interconnection cable (RB716A):



9.9.4 Connector's pin numbers and wire colors

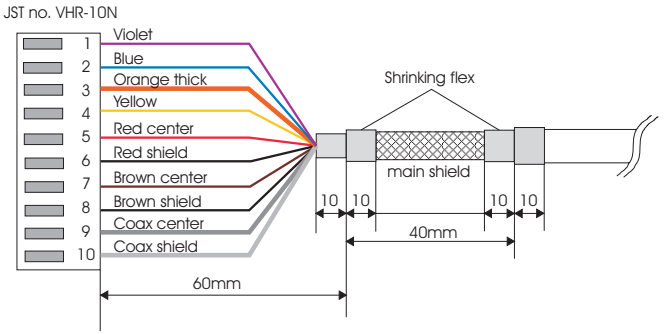
The connecting cable is supplied with the radar antenna. The 18-pin round connector is connected to the main unit's receptacle marked RADAR – refer to section 9.7 for details on pin numbers.

The connector at the other end of the connecting cable is for the radar antenna, and consist of the following pin numbers and wire colors:

Connector for the RB714A Radar antenna

Alternative colors:

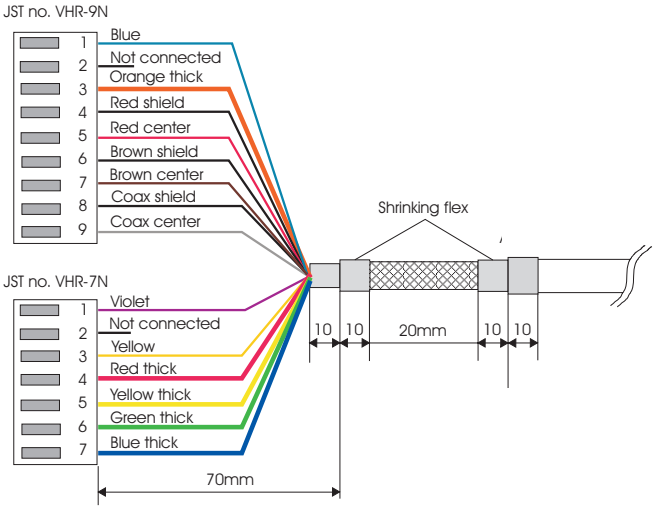
Pin 5: Red
Pin 6: Green
Pin 7: Brown
Pin 8: White



Connector for the RB715A Radar antenna

Alternative colors:

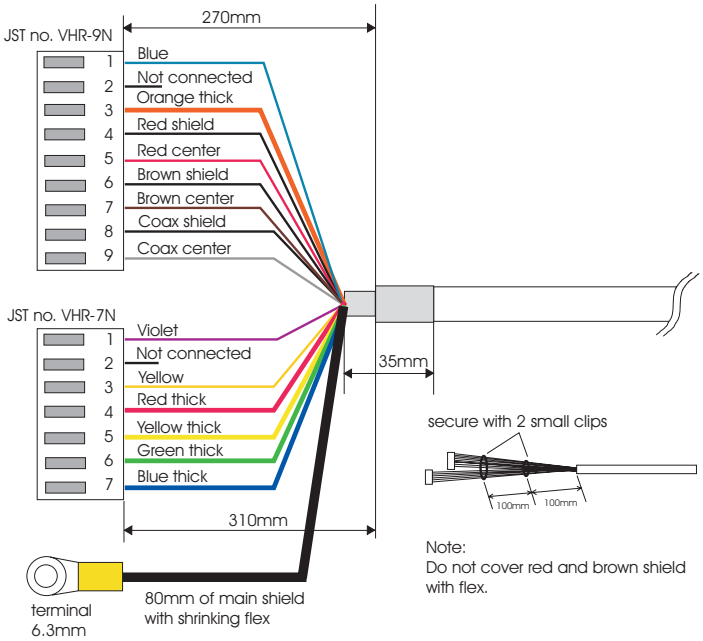
Pin 4: Green
Pin 5: Red
Pin 6: White
Pin 7: Brown



Connector for the RB716A Radar antenna

Alternative colors:

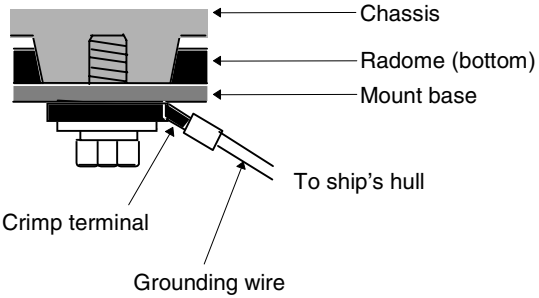
Pin 4: Green
Pin 5: Red
Pin 6: White
Pin 7: Brown



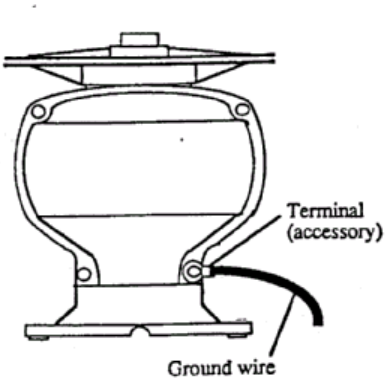
9.9.5 Grounding wire

Connect grounding wire from one of the bolts used for mounting the scanner unit to ship's hull. The crimp terminal and grounding wire are not included with the radar equipment.

Radome



Open scanner



9.9.6 Adjustment

When you have finished installing the scanner and display units and connecting cables, turn on the power to the display and scanner units and check to see if they operate normally without problem. Then make adjustments according to details in section 7.2.2 Initial radar display setup in the user manual. Be sure to follow these adjustments or the radar picture will not display a true image.

9.10 Preventive maintenance

Surface cleaning – to keep the CRXX cabinet and display screen clean, wipe the surfaces with a clean damp cloth. For heavier cleaning, use a clean, damp cloth which has been dipped in a solution of a mild dish detergent and water. Wring out firmly before wiping the unit.
☞ *Never use cleaning solutions containing spirit or alcohol.*

Electrical connections – periodically check the electrical connections. Make sure that connections are tight and that no cables are frayed or worn.

Radar antenna – periodically check that the scanner's fitting bolts are tight and not corroded. Every 6 to 12 months an even coating of grease should be applied to the entire surface of the antenna drive gear with a spatula or brush.
Most of the maintenance of the radar antenna should be left to qualified personnel. If there are problems with the performance, please contact your authorized dealer.
☞ Warning! Do not open the radome before the cable between the radar antenna and CRXX has been disconnected. It is **not** sufficient just to turn off the power by the switch, as the radar antenna is still supplied power inside.

9.11 Repair and service

The CRXX is sealed and does not contain any user serviceable parts. Opening of this unit will void its warranty. If the CRXX requires servicing or repair, call your authorized SIMRAD dealer, but first check section 9.12 Troubleshooting.

Spare parts – fuses may be bought from a chandler or a marine supply store.

Use only fuses specified for this unit – see 9.13 Specifications.
If you require a SIMRAD part, please contact your authorized dealer.

9.12 Troubleshooting

For all fault finding, first check that the supply voltage is between 10 – 32 V dc.		
Symptom	**Check**	**Remedy**
No picture on display screen.	Check that the unit is turned on.	Press the [PWR] key on keypad.
	Check fuse in CRXX power cable.	Replace fuse. Use only type F6.3A.
Picture appears on the display screen, but image is too dark or too bright.		Press [PWR], adjust light/ contrast, press [ENT].
No normal picture or key operation.		Turn unit off and on again.
		Disconnect power and connect power again.
	Check if C-MAP chart is defective.	Remove C-MAP chart via [MENU], [1], [3].
		Return to factory presets, see section 8.2.7.
No GPS position update.	Check external position to be OFF, refer to interface display in [MENU], [7], [2].	
	Check antenna and cable.	Replace antenna or cable.
Screen update is extremely slow.	Check that the stored Tracks and Routes (not currently in use) are not all drawn up on the chart.	Turn off "Course line" for each stored route in sec.5.2, and turn off "Display track" in sec.5.6.
Echo image on radar display differs from actual image.	Check if ship's heading is incorrect.	Set ship's heading correctly – see section 7.2.2.
	Check if timing is incorrect.	Set Zero Range correctly – see section 7.2.2.
Echo images on radar display are blurred.	Check if GAIN, STC or FTC is not adjusted properly.	Make adjustment – see section 7.2.5.
Too much noise in radar display.	Check if tuning is incorrect.	Adjust TUNE – see section 7.2.2.

9.13 Specifications of the CR40/42/50

General data

Power supply:	12 & 24V dc (10-32V dc max) 20-70 Watts.
Dimensions:	- CR40/42: H:220 (8.8") x L:365 (14.6") x D:75 (3") mm.
	- CR50: H:300 (12") x L: 445 (17.8") x D: 90 (3.6") mm.
Environment:	0°C to +50°C, waterproof USC 46 CFR and IP55.
Housing:	Casted aluminum back, polycarbonate front.
Weight CR40:	3.7 kg (7.4 lbs.).
Weight CR50:	5.3 kg (10.6 lbs.).
Display:	TFT/ATFT color, power backlight, 10.4 in. = 640x480 pixels,
	13.8 in. = 640x480 pixels.
Presentation:	4 pages (screen layers) each with several screen combinations.
	Manual operation or automatic rotation of the 4 pages.
Interfacing:	2 ports in/out NMEA 0183/0182/0180.
Alarm/log	Alarm relay (contact closure).
output:	200 pulses/nm (5 Volt pulses).
Main fuse:	F6.3A.

GPS section (prepared for SDGPS)

Receiver type:	14 channel parallel, C/A code, 8 state Kalman filter.	
Accuracy:	- standard:	Position: 8m RMS*
		15m – 95% of fixes.
		Speed: 0.1 kn*
		Heading: 1°*
	- DGPS:	Position: 2-5m RMS
		Speed: 0.1 kn
		Heading: 0.1°
Speed filter:	10 settings.	
Update rate:	1 second interval, typical	
Dynamics:	Velocity: 600 km/h	
	Acceleration: 10m/s^2	

*The accuracy is measured on a satellite constellation with HDOP <8 and without SA. The US Department of Defense has intentionally degraded the accuracy for civil users to <100m in 95% of the position fixes.

GPS Antenna RS5640

Type:	Quadrifilar Helix.
Dimensions:	L:230mm, D:38mm
Weight:	150gr

DGPS Antenna MGL-3

Type:	Patch (GPS) H-field (diff.).
Dimensions:	H:75mm, D:127mm
Weight:	600gr
Environment:	-35°C to +75°C, 95% rel.
Mounting:	1" 14 thread (standard US).
Cable:	10m RG58 (standard). Max. 15m RG58 (option). Max. 30m RG213 (option).

Chartplotter section

Chart system:	C-MAP NT
Presentation:	Two charts in different scales on screen simultaneously. Radar and chart split screen.

Radar section

Display modes:	Head Up, North Up, True Motion. Dual Range.
Range scale:	0.125 – 48nm in 11 steps or multi range.
Min. range:	30 meters
Range resolution:	30 meters
Bearing accuracy:	1° or better
Off-center:	Max 66%.
Guard zone:	Can be set at any desired distance and angle in any desired width. IN and OUT modes are available.
Stretch:	AUTO, PULSE, VIDEO.
Trail (wake):	30 sec., 1, 2, 5, 10, 15, 30 min. or permanent.

Radar supply box RS4050

Dimensions:	H:125mm, L:222mm, D:81mm
Cable to display unit:	1.5 meter (not extendable)
Fuse:	4A F

Radar antennas		**RB714A**	**RB715A**	**RB716A**
Radome:		45cm	65cm	
Open array:				3 or 4 ft
Scanner:		2kW	4kW	4kW
Range:		to 24nm	to 36nm	to 48nm
Rotation speed:		24rpm	24 or 48rpm	24 or 48 (24V) rpm
Beamwidth:	Horizontal	5.9°	3.9°	2.5°, 1.8°
	Vertical	25°	25°	22°
Cables:	10m	104.3002.012	104.3002.015	104.3002.008
	15m	104.3002.013	104.3002.016	104.3002.009
	20m	104.3002.014	104.3002.017	104.3002.010

Options

Sunhood
Simrad DataCards
TL50 Turbo Loader
C-MAP electronic charts NT
6-channel NMEA Buffer RS5345
Universal connection cable, type AMW STYLE 2464
DS40/42 Dual station, 10” TFT/ATFT monochrome or color LCD screen.
DS50 Dual station, 14” TFT color LCD screen.

Active display – is the display placed in the window with the highlighted frame on the screen. Only the active display on the screen is operable. Press the [WIN] key to toggle which display (window) should be the active one on the screen with the highlighted frame. Switch between active displays (windows) as required.

Active window – is recognized by the window on the screen with the highlighted frame. A new active window can be selected via the menu, press [MENU] and toggle active window by pressing [WIN] repeatedly, then select a new display from one of the menus. The window you selected in the menu bar will now have the highlighted frame and are therefore the new active window on the screen.

Almanac – a satellite's almanac data, is data which determines an approximate lane for satellites in orbit. The almanac data is used by the GPS receiver to find and lock onto the satellite signal. The CRXX has a built-in basic almanac.

AVN – Approximate Velocity Necessary – to arrive at a specific waypoint at a specific time.

Bearing – is the direction of where to go e.g. towards a specific waypoint.

Course – *Course Over Ground,* magnetic or true. The direction of which the vessel is moving.

dGPS – differential data is received from built-in DGPS module or an external DGPS Receiver.

DGPS – the position is being corrected by differential data.

ETA – Estimated Time of Arrival – at a specific waypoint if keeping a steady speed.

Grid - on chart can be set to AUTO / ON / OFF.
ON = the grid is always visible on the chart display.
OFF = the grid is turned off and will not show on the chart display.
AUTO = the grid will not appear in the ordinary chart display, but will be there when in overzoom and when "Chart" is turned off in the Chart setup, which means that there will be no World chart presented and no C-MAP charts presented – only user-made data such as waypoints, routes, lines and tracks, etc.

Great circle – the shortest distance on the globe.

Heading – the direction of which the vessel is pointing.

Interface – the connection between two pieces of equipment.

Lock cursors – will lock the cursors in two chart displays on the same screen and thus make the cursor movements synchronized. When moving the cursor to search for e.g. a harbor in one chart (large scale), the other chart (small scale) will automatically follow and thus reveal the details. This process is very demanding and may take some seconds extra for updating.

LOG speed calibration – the unit is preset to receive 19000 pulses per nautical mile from the log transducer (paddle wheel). However the figure might have to be changed to compensate for various transducers and actual water flow passing the transducer. The correct pulse rate is calculated by:

$$\frac{\text{19000 x indicated speed (e.g. 4kn)}}{\text{actual speed (GPS) (e.g. 5kn)}} = 15.200 \text{ pulses/nm}$$

Measurement units – the user may select the displayed units to be one of the following:

m	meters
ft	feet, 1 foot is 0.3048 meters
fm	fathoms, 1 fathom is 1.8288 meters
nm	*nautical mile,* 1 nm is 1,852 meters
kn	*knots,* nautical mile per hour
km	*kilometer,* 1 km is 1,000 meters
kh	*kilometer per hour*
mi	*statute mile,* 1 mile is 1,609 meters
mh	*mile per hour*

MENU – the selection of main menus will be shown in the upper part of the screen. Leaf through the menus by means of the cursor key and select the highlighted menu by pressing the [ENT] key, or use the numerical keys to activate one of the menus.

Navigation simulator - the chartplotter function features a built-in navigation simulator which can be used for demonstration purpose or for practicing 'live' navigation in 'off season'.
Navigation to cursor or waypoint, in route or in track is started as described in chapter 6. The navigation simulator is started via the NMEA interface setup: Press [MENU],[7],[2]; go to 'OFF' next to 'External position, course, speed:'

and press the [+] zoom key twice to toggle to: Dead reck.; move cursor to the right and enter a speed value of e.g. 10 knots; press [ENT] twice.
The ship symbol will now 'sail' to the point of destination directly or via the route you have selected and you can see how the alarms and automatic waypoint shift all work, as if you were sailing yourself. You can also simulate making a track trailing the ship or plotting eventmarks, etc. as the ship is 'sailing'.

NMEA – National Marine Electronics Association. The NMEA is an organization of manufacturers of marine electronics equipment. They have adopted the NMEA0183 as a standard for communications between various types of marine electronic equipment.

Port side – left (red). Opposite to Starboard – right (green).

Release cursors – see "Lock cursors".

Restart to approaching point – will automatic re-calculate the navigation data from current position to approaching point.

Rhumbline – is the straight line to a waypoint on a chart.

Route name – each route can be given a name for easy identification.

Speed – *Speed Over Ground,* measured in knots, kilometers, and miles.

Starboard side – right (green). Opposite to Port – left (red).

TFT display – Thin-Film Transistor (Active matrix).

Trackpoint advance – will automatically shift to the next trackpoint in the track and provide new steering details (Track navigation).

UTC – Universal Time Coordinates, which is equal to standard time in London (GMT). UTC is not affected by the local summertime adjustments.

Velocity (VMG) – speed towards approaching waypoint.

Waypoint advance – will automatically shift to the next waypoint in the route and provide new steering details (Route navigation).

Waypoint name – a name can be added to each waypoint for easy identification.

WPplot – instant storage of actual position as a waypoint.

XTE – Cross-Track-Error (-Distance), measured magnitude of the position error perpendicular to the intended track.

Radar section:

Cursor EBL - can provide an image on the radar display which will determine the risk of a collision if you continue on the proposed course line. The bearing and distance from ship's position to cursor position will be displayed in the top line of the screen.

Cursor feature - The cursor appears on the display as a large (+) character. To activate the cursor, just press the cursor key. The cursor may now be positioned by using the cursor key. When the cursor is set to a position on the screen, the bearing and distance from ship's position to cursor position will be displayed in the top line of the screen.
☞ To turn off the cursor, press CLR.

The chart cursor can be synchronized to the radar cursor, and thus be controlled by the radar cursor in split screen operation.

EBL (Bearing mode) key – the EBL bearings may be displayed in either degrees Relative "R" or True "T", depending on the selected orientation (HU, NU, TM).

GAIN control - adjusts the gain level of the radar's receiver. The Gain control level is usually set for the best target presentation with a slight noise speckle in the background on the 12 or 24nm range. The Gain control level may be reduced on shorter ranges to improve target definition as necessary and increased on longer ranges.
Use some caution when adjusting the Gain control. If gain is set too low, small or weak targets may be missed. If the gain is set too high on short ranges, the CRT may become excessively covered with noise speckle making target observation difficult.
☞ On the longer range scales (24nm or greater), the sea clutter control may be

advanced to decrease excessive video clutter around own ship's position in the center of the display if necessary.

Guard zone The use of the Guard zone feature built into the radar can detect approaching vessels entering your "comfort" zone and you can use the guard zone while you are moving or when anchored to protect you in a full 360 degrees. The audio alarm can be sounded from the unit or through an external speaker/buzzer wired into the system – see section 9.7 Electrical connections.

☞ Warning! When you have set up a guard zone, the system generates an alarm tone when there is an echo greater than the preset level in this zone. However, this does not mean that the alarm tone is always generated from ships or land alone. You may need to adjust sensitivity and set rain and sea clutter properly after considering the effects of sea surface conditions and meteorological conditions (rain or snow). Note also that this function does not eliminate the need for maintaining a watch in your ship.

HU – Head-Up The heading line always appears on the display at 0 degrees as the antenna passes the bow of the vessel. Targets appearing on the display are relative to your own ship's position and heading.

IR – Interference Rejection.

Lock chart cursor to radar cursor – will synchronize the two cursors in split screen operation. The synchronization is controlled from the radar display.

Navigation points - approaching + next navigation point can be shown on the radar display when operating in navigation mode.

NU – North-Up In this mode, targets are displayed at their measured distances in true direction from your boat. North being at the top of the display. In the North-Up mode, you must be interfaced with an electronic compass for proper operation.

Off-Center mode - lets you position the origin own ship to any point on the screen within 66% of the radius of the display (the center 2/3 of the display). The Off-Center mode permits the operator to obtain a greater view in the direction of interest.

PLOT function – will require that a heading sensor (Gyro or Compass) is connected to the CRXX. If so, then you can plot the actual cursor position on the radar display by pressing the [PLOT] key from the radar display, and thereby save the position in the WP-list as a waypoint i.e. you can give the plotted waypoint a new name/number, symbol, color, etc.

PPI center – Plan Position Indicator.

RAIN CLUTTER Control – also known as Fast Time Constant (FTC), is used to reduce large clutter masses caused by rain or snow and allow targets masked by this clutter to be seen on the radar display. This control differentiates the multitude of small radar returns from rain, effectively reducing or eliminating the rain clutter and allowing the operator to observe larger vessel traffic within the rain clutter. It has the effect of only displaying the leading edge of large echoes and will tend to effect the smaller echoes only slightly. This can be of great advantage on shorter ranges to distinguish between two very close echoes on the same bearing which may otherwise merge and appear as one echo.

Relative Motion Land, buoys and fixed objects move past own ship. In the North-Up mode, you must be interfaced with an electronic compass for proper operation.

SEA CLUTTER Control – also known as the Sensitivity Time Control (STC), is normally used on the shorter ranges to suppress the effects of sea clutter close to own ship by reducing the nearby gain level. It can effectively reduce the strength of the mass of random echoes received from nearby sea clutter for up to approx. 3 to 5 nm depending on wave and sea conditions. STC control is set to reduce the strength of these echoes such that the clutter appears only as intermittent small dots, yet small targets can still be distinguished.

☞ On short range scales, the setting of the sea clutter control should never be advanced so high as to obliterate all clutter, since this setting could prevent the detection of close in-target echoes.

Trails – is a feature which allows the operator to see the past history of target movement as an after-glow or "Wake" behind the moving targets or own ship. If the range scale is changed, the trails are cleared and new trails histories will be redrawn to the screen.
The trails are drawn for anything that moves on the screen, including sea gulls, sea clutter, buoys, lobster pots, and shoreline. In general it is better to use the

trails feature away from harbors and the shoreline to avoid a cluttered display to better concentrate on trails of target vessels, etc.

True motion – land, buoys and fixed objects remain stationary while targets and own ship track across screen. In the North-Up mode, you must be interfaced with an electronic compass for proper operation.

TUNE control – is a variable control used to tune the receiver in the pedestal/ radome for maximum target returns on the display. If no land or ship targets are available, the operator may tune for maximum sea clutter. The tuning indicator will show the strength of tuning peak conditions and is tuned for maximum deflection. Normally, tuning of the radar is performed on the 3nm range scale or higher.

Select the appropriate datum by inserting the number prefix: Press [MENU], [2], [1], [ENT], and key in the desired number by means of the numerical keys or the +/- keys, confirm entry by [ENT].

000 World Geodetic System 1984
001 World Geodetic System 1984
002 European 1950
003 European 1979
004 North American 1927
005 North American 1983
006 Geodetic Datum 1983
007 Ordnance Survey of GB 1936
008 South American 1969
009 Adindan
010 Afgooye
011 Ain el Abd 1970
012 Anna 1 Astro 1965
013 Arc 1950
014 Arc 1960
015 Ascension Island 1958
016 Astro Beacon E
017 Astro B4 Sorol Atoll
018 Astro Dos 71/4
019 Astronomic Station 1952
020 Australian Geodetic 1966
021 Australian Geodetic 1984
022 Bellevue (IGN)
023 Bermuda 1957
024 Bogota Observatory
025 Campo Inchauspe
026 Canton Astro 1966
027 Cape
028 Cape Canaveral
029 Carthage
030 Chatham 1971
031 Chua Astro
032 Corrego Allegre
033 Djakarta
034 DOS 1968
035 Easter Island 1967
036 Gandajika Base
037 Guam 1963
038 GUX 1 Astro
039 Hjorsey 1955
040 Hong Kong 1963
041 Indian
042 Ireland 1965
043 ISTS 073 Astro 1969
044 Johnston Island 1961
045 Kandawala
046 Kerguelen Island
047 Kertau 1948
048 L. C. 5 Astro
049 Liberia 1964
050 Luzon
051 Mahe 1971
052 Marco Astro
053 Massawa
054 Merchic
055 Mercury 1960
056 Midway Astro 1961
057 Minna
058 Modified Mercury 1968
059 Nahrwan
060 Nanking 1960
061 Naparima, BW1
062 Observatorio 1966
063 Old Egyptian
064 Old Hawaiian
065 Oman
066 Pico de las Nieves
067 Pitcairn Astro 1967
068 Prov. South Chilean 1963
069 Prov. South American 1956

070 Puerto Rico
071 Qatar National
072 Qornoq
073 Reunion
074 Rome 1940
075 Santo (DOS)
076 Sao Bras
077 Sapper Hill 1943
078 Schwarzeck
079 South Asia
080 Southeast Base
081 Southwest Base
082 Timbalai 1948
083 Tokyo
084 Tristan Astro 1968
085 Viti Levu 1916
086 Wake-Eniwetok 1960
087 Wake Island Astro 1952
088 Zanderij
089 Finnish Datum
090 Swedish Datum
091 World Geodetic System 1984
092 World Geodetic System 1984
093 World Geodetic System 1984
094 World Geodetic System 1984
095 World Geodetic System 1972
096 World Geodetic System 1984
097 World Geodetic System 1984
098 World Geodetic System 1984
099 Lisboa Datum
100 Pulkovo 1942
101 North Am. 1927 Alaska, Can.
102 South American – Yacare
103 Old Hawaiian Maui
104 Old Hawaiian Oahu
105 Old Hawaiian Kauai
106 Bukit Rimpah
107 Camp Area Astro
108 Guam 1963
109 G. Segara
110 Herat North
111 HU-TZU-SHAN
112 Indian (old)
113 Qornoq Datum 1927
114 Scoresbysund Datum 1952
115 Angmassalik Datum 1958
116 Tanarieve Observatory 1925
117 Timbalai
118 Special Indian (MGRS rel.)

C-MAP attributes

The optional detailed C-MAP carts can provide numerous of functions which are accessible via symbols presented on the chart.
Place the cursor on a C-MAP object and press [ENT] to call up an info window:

Scale: 1:200000		Actual chart scale.
No user data at cursor position		
1	Edit user data	-Inactive function.
2	Chart info	-See below.
3	Find nearest port services	-See below.
4	Bearing & dist. from A to B	-Section 3.3 Info windows.
5	Lock cursors	
9	Chart setup	-Section 3.4 Chart setup.
0	Cursor to center	-Section 3.3 Info windows.
GOTO	Select NAV mode	-Section 3.3.8 GOTO function.
PLOT	Plot new data	-Section 3.3.9 PLOT function.
PAGE	More user data	-Inactive function.
MENU	Exit	

2 *Chart info* will provide information on the C-MAP objects e.g. Lighthouse, Depth area, Fishery zone, Navigation mark, Buoy, Fog signal, etc. Even though it says "No attributes" for an object, you may try to press [ENT] to see if there is additional information available for the object. The additional information for e.g. Lighthouse could be: Lights and Tower.

3 *Find nearest port services* will call up a list of symbols with relevant information on each symbol e.g. use cursor to go to the **"Port/ Marina"** symbol and then use the +/- keys to highlight the location you wish to locate on the chart by pressing [ENT].
☞ The chart will now zoom in on the Port/Marina location you selected from the list.

Use the same procedure to locate a Hospital, Coast Guard, Fuel Station, Public Telephone, Provisions, etc.

Tide information

To gain access to the tide information, you first have to located the tide symbol – a shape of a diamond with a **T** in the middle – on the chart. Place the cursor on the symbol, and press [ENT].

The info window (see previous page) will appear on the screen. Press [2] Chart info to call up the **Tide height** information.

In most places there are two high and two low tides per day. The heights of the high tides, or the low tides, may not be the same. The height of the tide varies with the time of year.

Object name is the location name of the Tide station.

Time zone: -1 indicates that the local time is 1 hour less than the standard time in London (GMT).

The low and high tides are shown for one day at a time. The 24-hour time schedule will always run from 00 hours to 24 hours each day. The information provided will always be for the present day.

However, if you wish to see the low and high tides for a different date – in the past or in the future – it is possible to change the date:

Day In the display there will be a red box cursor on the number of the day in the month. Toggle to a different number (date) with the +/- keys.

Month Use the cursor to go to the present month. Toggle to a different month with the +/- keys.

Year Use the cursor to go to the year. Toggle to a different year with the +/- keys.

The last four lines in the Tide display will inform of *Begin Twilight, Sunrise, Sunset* and *End Twilight* for the present day.

Caution
The tide information system is quite accurate. However, the predictions are

subject to variables, which, like the weather, are beyond the control of man. The tide predictions are based on normal weather conditions. Hurricanes and strong winds will often have a strong influence on the water level, which can vary several meters.

Changes in a coast line, either due to natural erosion, major storms or larger man-made constructions, like breakwaters or dredged canals, can also have influence on the local tide situation.

Objects organized in categories

The purpose of the C-MAP functions is to select objects, which are to be displayed on the screen (chart). The objects are organized in categories and each category can be selected as one, without having to decide upon almost 300 objects separately. ☞ Refer to section 3.4 Chart setup.

The following functions are used to enable/disable visualization of the categories listed below:

LAND SETTINGS		
Natural features:	Cultural features:	Landmarks:
Coastline	Airport area	Building, religious
Dune area	Built up area	Building, single
Hill area	Railway	Cemetery
Land elevation	Road crossing	Fortifid structure
Land region	Road part	Siloway route part
Salt pan	Runway	Tank
Slope topline	Sloping ground	Chimney
Tree point	Square area	Dish aerial
Vegetation area	Cable, overhead	Flagstaff/Flagpole
	Fence line	Flare stack
Natural features RIVERS:	Pipeline, overhead	Mast
Canal	Pylon	Monument
Canal bank	Telepheric	Radar dome plan landing area
Rapids	Tunnel entrance	Tower
River		Windmill
River bank		Windmotor
Waterfall		
Lake area		
Lake shore		

MARINE SETTINGS		
Tideways, currents:	Depths:	Nature of seabed:
Tideway	Depth contour	Sand waves
Water turbulence	Shallow water blue	Seabed area
Tide height	Zero meter contour	Spring
	Soundings:	Weed/Kelp
	Spot sounding	

NAVAL AIDS SETTINGS		
Ports:	Sailmaker	Caution areas:
Berthing facility-up area	Fishing/diving gear	Fishing facility
Causeway	Scuba recharge	Marine farm/culture
Checkpoint	Hotel/Inn	Cable, submarine
Crane	Restaurant	Cable area
Dam	Bank/Exchange office	Offshore production area
Distance mark	Pharmacy	Pipeline area
Dock area	Port/Marina	Anchor berth
Dry dock	Boat hoist	Anchorage area
Dyke area	Fuel station	Cargo transhipment area
Dyke crown	Water	Contiguous zone
Floating dock	Electricity	Continental shelf area
Gate	Showers	Custom zone
Harbor facility	Laundrette	Dumping ground
Landing place	Public toilets	Exclusive economic zone
Lock basin	Post box	Fishery zone
Oil barrier	Public telephone	Fishing ground
Ramp area	Refuse bin	Free port area
Shoreline construction	Visitors' berth	Harbor area (administr.)
Slipway	Chaneler	Incineration area
Weir line	Provisions	Log pond
Small craft facility	Bottle gas	Military practice area
Coastguard station	Car parking	National territorial area
Pilot boarding place	Parking for boat + trailer	Restricted area
Rescue station	Caravan site	Sea-plane landing area
Signal station, traffic	Camping site	Spoil ground
Signal station, warning	Sewerage pump station	Straight territorial sea baseline
Port area	Public telegraph	
Harbor master	Public radio	Submarine transit lane
Coast Guard	Public radiotelegraph	Territorial sea area
Police		
Customs		
Health emergency		
Post office		
Yacht club		
Boat yard		
Marine electronics		
Electric/electronic repairs		
Engine repairs		

Tracks, routes:	Lights:	Signals:
Deep water route part	Light	Anchor point
Deep water route centrel.	Light, moiré effect	Cairn
Fairway	Light float	Chain/Wire
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SIMRAD
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Simrad Shipmate AS

Declaration of Conformity

The EMC Directive, Article 10 (1)

Undersigned are herewith declaring, that

Product: SIMRAD CR40/42
DGPS ChartRadar

is in accordance with the protection requirements in

the EMC Directive 89/336/EØF of May 3rd, 1989

Employed harmonized standards:

EN 60945:1993 / Amd.1:1993

Støvring February 15, 2001

Simrad Shipmate AS
Østre Allé 6
DK-9530 Støvring
Denmark

John Larsen
Excecutive Vice President

SIMRAD
A KONGSBERG Company

Simrad Shipmate AS

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The EMC Directive, Article 10 (1)

Undersigned are herewith declaring, that

Product: SIMRAD CR50
DGPS ChartRadar

is in accordance with the protection requirements in

the EMC Directive 89/336/EØF of May 3rd, 1989

Employed harmonized standards:

EN 60945:1993 / Amd.1:1993

Støvring February 15, 2001

Simrad Shipmate AS
Østre Allé 6
DK-9530 Støvring
Denmark

John Larsen
Excecutive Vice President

SIMRAD warrants that every product shall be free of defects in material and workmanship as specified below:

CATEGORY "A": •Autopilots •Radars •Instruments •Navigators •Radiotelephones •Plotters •Gyro compasses •Sonars •Echo sounders •Trawl Instrumentation.
These products are warranted for a period of 24 months on parts and 12 months on labor from date of purchase, except for category B items. Consumable parts such as lamps, fuses, batteries, bearings, etc. are not covered by this warranty.

CATEGORY "B": •Antennas •Transducers •Trawl sensors •Monitors (CRT) •Gyro sensitive elements •Radar magnetrons •Disk drives.
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Maximum liability shall not, in any case, exceed the contract price of the products claimed to be defective.

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DK-9530 Støvring
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SIMRAD
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_____
OWNER

_____
ADDRESS

_____
VESSEL

_____
HOME PORT

_____
TYPE

SERIAL NO.

_____
EQUIPMENT

_____

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_____
DATE OF PURCHASE

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DATE OF INSTALLATION

YES:_____ NO:_____
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AUTHORIZED INSTALLER/DEALER STAMP

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Simrad Shipmate AS
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_____
OWNER

_____
ADDRESS

_____

_____
VESSEL

_____
HOME PORT

_____
TYPE

SERIAL NO.

_____
EQUIPMENT

_____

_____

_____

_____
DATE OF PURCHASE

_____
(CUSTOMER'S SIGNATURE)

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DATE OF INSTALLATION

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